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CONTENTS

UDC 577.12.591

FACTORS INFLUENCING FORMATION AND PROPERTIES OF OVINE HAPTOGLOBIN-HEMOGLOBIN COMPLEXES

Moscow BIOKHIMIYA in Russian Vol 47, No 5, May 82 (manuscript received 31 Mar 81) pp 767-771

BEYSEMBAYEVA, R. U., Institute of Experimental Biology, Kazakh SSR Academy of Sciences, Alma-Ata

[Abstract] Investigations were conducted on the effects of pH, detergents, and ions on the formation and properties of ovine haptoglobin-hemoglobin (Hp-Hb) complexes. The results showed that optimum complex formation occurred in the pH range 4.5-7.0; the peroxidase activity of Hb which is known to be potentiated by complexing with Hp, attained a maximum at pH 4.3. Urea, sodium dodecylsulfate, and sulfates inhibited complex formation (in terms of peroxidase activity), while the tetraborate anion promoted Hp-Hb complex formation. These effects were apparently due to interaction with Hp and alteration of the latter's properties, since the peroxidase activity of free Hb was not affected by these factors. Figures 1; references 17: 5 Russian, 12 Western.
[360-12172]

UDC 577.154

STEREOSPECIFICITY OF ACTIVE SITE OF ACYLCHOLINESTERASES

Moscow BIOKHIMIYA in Russian Vol 47, No 5, May 82 (manuscript received 15 Apr 81) pp 803-809

VOLKOVA, R. I., BRESTKIN, A. P. and KOCHETOVA, L. M., Institute of Evolutionary Physiology and Biochemistry imeni I. M. Sechenov, USSR Academy of Sciences, Leningrad

[Abstract] Human erythrocyte acetylchlinesterase (I) and equine serum butyryl cholinesterase (II) were compared for the stereospecificities of their active sites by reaction with a series of organophosphorus inhibitors with

an asymmetric P atom of the following type: $C_2H_5O(CH_3)P(O)SR$, where R = C_3H_7, C_6H_{13}, $C_4H_4SC_2H_5$, $C_2H_4SC_2H_5$, or $C_2H_4\overset{+}{S}(CH_3)C_2H_5$. The results showed that the (-) isomers were far more efficient inhibitors of the acylcholinesterases, and the difference in the inhibitory actitivities between the (-) and (+) isomers was most pronounced in the case of the R = C_3H_7 and $C_4H_4SC_2H_5$ inhibitors. Furthermore, the stereospecificity of the active site of I was far more pronounced than that of the site of II. Following the treatment of I with N,N-dimethyl-2-phenylaziridium, which modifies the active site of I, the stereospecificity of I became comparable to that of II. Evidently, the active sites of I and II differ in their spatial organization. Figures 1; references 22: 5 Russian, 17 Western.
[360-12172]

UDC 576.8.097.29:612.351

EFFECTS OF SHIGELLA FL.2a ENDOTOXIN ON RESPIRATION AND OXIDATIVE PHOSPHORYLATION OF HEPATIC MITOCHONSRIA IN RAT

Tashkent UZBEKSKIY BIOLOGICHESKIY ZHURNAL in Russian No 2, Mar-Apr 82 (manuscript received 20 May 81) pp 3-6

ALMATOV, K. T., BABADZHANOVA, B. N. and AGZAMOV, Kh., Uzbek Scientific Research Institute of Epidemiology, Microbiology and Infectious Diseases

[Abstract] In vitro studies were conducted on the effects of Shigella Fl. 2a endotoxin on the respiration and oxidative phosphorylation of hepatic mitochondria derived from rats. The extent to which mitochondrial respiration was inhibited and oxidative phosphorylation uncoupled depended on the pathogenic strain from which the endotoxin was isolated and the substrate oxidized. Furthermore, resolution of the endotoxin on Sephadex G-75 showed that the first fraction influenced oxidative phosphorylation (in terms of ADP/O values) more profoundly than the second fraction. Endotoxins derived from Shigella strains with different pathogenicity varied in the efficiency with which they affected ATP synthesis and electron transport. The most pronounced effects on respiration and oxidative phosphorylation are evident in the oxidation of the NAD-dependent substrates. Figures 3; references 5: 1 Russian, 4 Western.
[381-12172]

UDC 575.1:599.323

MAPPING OF TWO CLONED DNA FRAGMENTS CONTAINING MOUSE GENOME REGIONS TRANSCRIBED INTO PRE-mRNA

Moscow GENETIKA in Russian Vol 18, No 5, May 82 (manuscript received 3 Nov 81) pp 713-722

TOKARSKAYA, O. N. and RYSKOV, A. P., Institute of Molecular Biology, USSR Academy of Sciences, Moscow

[Abstract] Investigations conducted with two DNA fragments (71a and 98a) of the mouse genome showed that both contained sequences hybridizing with polysomal poly(A)+mRNA (or cDNA), double-stranded RNA (dcRNA-B) isolated from pre-mRNA, and oligo(dT). The 98a fragment possessed three different repetitive regions hydridizing with mRNA or cDNA separated by AT clusters, B2 sequence, and a nonrepetitive DNA region which is also transcribed to mRNA. These three regions constitute a nuclear transcript sedimenting at ca. 28S. The results of restriction mapping and hybridization analysis have shown that in the case of both fragments the B2 (dcRNA-B2) sequence is located alongside repetitive, actively transcribed sequences detectable in the composition of the polysomal mRNA (or cDNA). To date, the functional relationship of these repetitions to the processing and splicing of pre-mRNA remains unclear. Figures 7; references 23: 4 Russian, 19 Western.
[367-12172]

UDC: 576.8.095

MICROBIOLOGICAL DEGRADATION OF HYDROCARBONS AND ECOLOGICAL CONSEQUENCES THEREOF

Moscow BIOLOGICHESKIYE NAUKI in Russian No 3, Mar 82 (manuscript received 3 Jul 81) pp 5-13

[Article by T. V. Koronelli, recommended by the Department of Plant Physiology, Moscow State University imeni M. V. Lomonosov]

[Text] This survey deals with accessibility of different classes of hydrocarbons to microbiological oxidation: paraffins, cycloparaffins and aromatic hydrocarbons. Paraffins are not toxic to microorganisms and are actively oxidized by natural microflora. Aromatic hydrocarbons and their derivatives are cellular poisons. Conjugate oxidation processes play a large part in their biological degradation in an ecological system. Assessment is made of ecological consequences of microbiological oxidation of different types of hydrocarbons. It is reported that contamination of ecosystems with paraffin hydrocarbons leads to intensive development of microorganisms that are taxonomically close to pathogenic ones. In this regard, it is stressed that it is necessary to investigate the virulence of paraffin-oxidizing microflora.

At the 26th CPSU Congress, the task was formulated of further development of research in the field of ecology and environmental protection. Work on microbiological oxidation of hydrocarbons, which pollute fresh and salt water, as well as soil, is referable to such research. The main source of hydrocarbons is petroleum and products of its refinement (various fuels, oil, lubricants). The influence of petroleum pollutants on nature and various forms of life is common knowledge. Spilled petroleum is collected by means of equipment and sorbents. What cannot be picked up is submitted to microbiological degradation. However, the components of petroleum differ drastically in their effects on living organisms. Accordingly, there are differences in detriment caused by petroleum pollutants differing in composition.

Hydrocarbons, as the name indicates, consist only of carbon and hydrogen atoms. They are divided into hydrocarbons with open chain (acyclic), cyclic and aromatic. Each of these three groups has its own inherent properties and level of toxicity. Crude oil contains all three types of hydrocarbons and, the proportion of each changes depending on the oil field. In gasoline and diesel fuel, there are aromatic hydrocarbons, benzene and its alkyl-substituted forms, in addition to acyclic hydrocarbons.

Saturated hydrocarbons with a straight chain (normal alkanes) are the most resistant to chemical factors. At ordinary temperatures, they do not react even with the strongest oxidants, for example, sulfuric acid. The presence of a double bond renders them capable of connection reactions at the site of the double bond. Cycloalkanes and cycloalkenes are more reactive than the corresponding hydrocarbons with an open chain. Aromatic hydrocarbons, which are based on a benzene ring with a system of conjugate double bonds, are the most reactive.

However, everything is just the opposite with regard to oxidation by microorganisms. The most accessible to bacterial enzymes are n-alkanes (paraffins), which are chemically inert and stable substances. Paraffins may be the only source of carbon and energy for saprophytic mycobacteria and related organisms, for a number of pseudomonad species, several yeast genera and some fungi. There are two factors that determine microbiological oxidation of paraffins: presence of compound enzymes--oxidases with mixed functions (oxygenases), which implement introduction of 1 atom of oxygen from its molecular form to the end methyl group of hydrocarbon, and presence of devices in cells that provide for absorption of hydrophobic substrate, which is not miscible in water, such as n-alkanes. Enzymes responsible for oxidation of hydrocarbons are linked with membrane structures of cells [17, 33]. Mechanisms of oxidation of paraffin hydrocarbons have been discussed in surveys [24, 48].

If insertion of a double bond in the molecule of n-alkane increases its accessibility to chemical oxidation expressly at the site of the double bond, enzymatic oxidation usually proceeds for the terminal methyl group, as in the case of saturated n-alkanes. Thus, when mycobacteria utilize normal C_{12}-C_{17}-1-alkenes, ω-unsaturated fatty acids are formed [31]. While alkanes with a branched chain of carbon atoms submit more easily to chemical treatment than normal ones, they are virtually inaccessible to biochemical oxidation. Microorganisms are seldom encountered that are capable of oxidizing isoprenoid hydrocarbons pristane and squalene. This is apparently related to the conformation of molecules of substrate and enzymatic protein. Synthetic polymers are among the main sources of contamination by branched hydrocarbons.

Several studies established that oxygenases are inducing enzymes [8, 28, 40]. The products of successive hydrocarbon oxidation serve as inductors: higher aliphatic alcohols, aldehydes, acids. However, there are many microorganisms that assimilate fatty acids but do not grow on media with n-alkanes. This is related to the fact that by far not all microorganisms can absorb hydrocarbons that are not water-soluble. The vast majority of substrates whose oxidation occurs within the cell are soluble in water. Lipophilic cell wall and membrane are required for absorption of hydrophobic compounds. V. V. Rachinskiy, Ye. G. Davidova and others have shown [9] that hydrocarbon absorption by yeast cells occurs in a passive and diffuse way. We have demonstrated passive absorption of the hydrocarbon, hexadecane by cells of saprophytic mycobacteria and arthrobacteria [5, 6, 14].

The lipids of external cell layers play a significant part in the process of passive absorption of hydrocarbons. Canals appear in the cell walls of Candida tropicalis yeast growing in a medium with hydrocarbon, and these canals are filled with electron-dense substance, apparently a lipopolysaccharide [12, 20].

The hydrocarbon molecules pass into cells through these canals. Saprophytic mycobacteria and related microorganisms (Corynebacterium, Nocardia, Rhodococcus) consume hydrocarbons with the entire cell surface. The cell walls of these bacteria are unique in their lipophilism: they contain up to 30% lipids [22, 25], whereas lipids constitute less than 5% in cell walls of other Gram-positive bacteria [32]. Mycolic acids--high molecular acyclic β-hydroxy acids with a long aliphatic chain in the α-position [13, 18, 38]--are mandatory structural components of the cell walls of saprophytic mycobacteria:

$$CH_3(CH_2)_n—CH(OH)—\underset{\displaystyle (CH_2)_mCH_3}{\overset{\displaystyle |}{CH}}COOH \quad \begin{matrix} n = 14—22, \\ m = 9, 11, 13. \end{matrix}$$

These compounds are contained in cells of all mycobacteria and related genera of bacteria (Nocardia, Corynebacterium, Rhodococcus); they are not encountered in cells of other microorganisms. Mycolic acids are present in cell walls in either a free state or in the form of compound esters with peptides and polysaccharides. For this reason, the above-mentioned microorganisms are capable of readily absorbing a hydrophobic substrate, as well as of developing directly in hydrocarbon film.

Arthrobacteria apparently absorb hydrocarbons not through the entire cell surface but, like in yeast, through canals in them [14, 19]. Bacteria of the genus Pseudomonas are also referable to active hydrocarbon-oxidizing microorganisms. However, just how these bacteria absorb n-alkanes has not yet been determined.

Microorganisms that assimilate n-alkanes are not specific (with the exception of methane-oxidizing ones); they are widespread in all areas and the normal component of unpolluted ecosystems. The studies pursued by V. V. Il'inskiy, M. V. Gusev and us [11] revealed that there is inherently a high level of hydrocarbon-oxidizing bacteria (up to 10,000 cells/mℓ), among which there is prevalence of saprophytic mycobacteria and arthrobacteria, in coastal waters of Mednyy Island (in the north Pacific), which contain no petroleum hydrocarbons, but are rich in organic residues of plant and animal origin. Analogous findings were made by foreign researchers who studied estuarian microflora [29]. Hydrocarbon-oxidizing bacteria were found in all samples of pristine mountain soil [36] Among them, there was prevalence of cells of Pseudomonas, Mycobacterium, Corynebacterium, Nocardia Saccharomyces and Candida yeast, and certain fungi. Expressly nonspecificity of the paraffin-oxidizing microflora explains the strong capacity of soil and water biocenoses for self-purification when contaminated by this type of hydrocarbon.

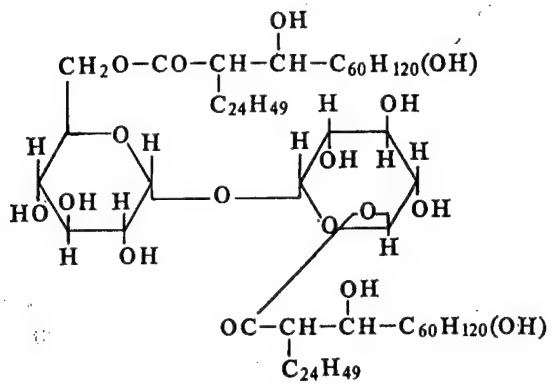
Are paraffins toxic? Definitely not. Microorganisms develop directly in film or on particles of solid hydrocarbons (provided there is contact with water) [14]. Many microorganisms that do not oxidize n-alkanes can withstand high concentrations thereof. A significant quantity of bacteria that withstand diesel fuel in medium in a concentration of up to 1% is present in salt water [7, 11]. Paraffinization has been long used to protect various preparations and foods from spoiling and drying, as well as to treat packages.

Paraffin is also used in medical practice for treatment of a number of diseases. At the present time, purified paraffins are used to recover feed protein by the microbiological method. There are enzymatic systems in the human body that oxidize n-alkanes via the monoterminal route [1]; these compounds are absorbed through the mucosa of the small intestine [2]. Thus, accidental intake of small amounts of paraffin is not hazardous to man.

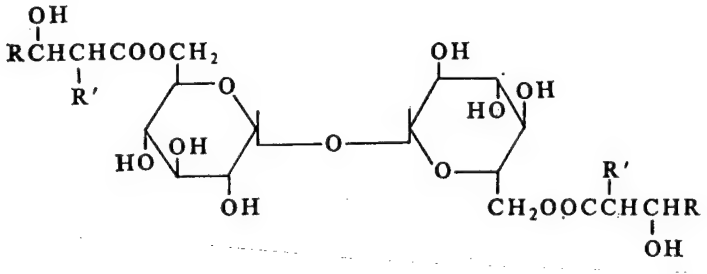
The harm caused by paraffin hydrocarbons is related to accidental petroleum leaks, and it has a physical basis. The enormous mass of liquid hydrocarbons, covering the water surface, make air exchange and delivery of oxygen difficult for marine flora and fauna, leads to change in physical parameters of their habitat, impairs the function of the integument of animals and plants. This aspect of the pollution problem has been discussed comprehensively in the book by Nelson-Smith, "Petroleum and Ecology of the Sea" [21].

Mass scale pollution of water or soil with aliphatic hydrocarbons causes changes in composition of natural microbiological cenoses. There is active development of paraffin-oxidizing microflora, saprophytic mycobacteria and related forms, pseudomonads, some yeast and fungi. As the hydrocarbons are oxidized, diverse heterotrophic microflora appears, which assimilates the products of vital functions of carbohydrate-oxidizing microorganisms. The organic matter, which settles at the bottom, is submitted to anaerobic decomposition. The process ends with complete utilization of paraffin hydrocarbons in inclusion thereof in the natural cycle of matter.

It would seem that such a natural course of events would not involve any complications. However, this is not entirely so since, when there is contamination with paraffin hydrocarbons there is intensive development of microorganisms that are taxonomically close to pathogenic ones. As we know, saprophytic mycobacteria are related to mycobacteria that cause tuberculosis and leprosy, as well as corynebacteria which cause diphtheria. Of course, it is virtually unlikely for these forms to develop in oil spills; however, prolonged persistence and concentration are possible. Thus, Lukins and Foster [41], who studied the attitude of different mycobateria (including those isolated from man) to n-alkanes showed that even Mycobacterium tuberculosis is "positive" (i.e., demonstrates mild growth) for this substrate. On the other hand, cases of diseases have been described whose pathogens are saprophytic and rapidly growing mycobacteria. M. Marinum, which was isolated from water, produces severe skin lesions (hyperkeratosis), mainly on the elbows and knees [44]. The saprophytic mycobacteria inhabiting West Africa, on some types of grass, elicits painful ulcerations if it penetrates into the skin through a scratch. There are other known diseases of man and animals whose pathogens are freely living mycobacteria and related organisms [47]. Pathogenic mycobateria and corynebacteria form a toxin, the cord factor, which is 6,6'-dimycolate of trehalose. This is one of the most potent toxins of bacterial origin. The cord factor, which is produced by M. tuberculosis, has the following formula [42, 43]:



The cord factor isolated from Corynebacterium diphtheriae cells differs from the one we have described in that the mycolic acids that acylate trehalose hydroxy groups have a lower molecular weight (32 atoms of carbon per molecule, versus 87 atoms of carbon) [49]. The same substance is produced in large quantities by cells of ordinary soil saprophytes incubated on media with paraffins--Arthrobacter paraffineus [51] and M. paraffinicum [4]. The cord factor isolated from M. paraffinicum has the following structure:



where R is the alkyl C_{19}-C_{29}; R' is alkyl C_{10}, C_{12} or C_{14}.

Our studies revealed [6, 15] that the quantity of mycolic acids and esters thereof in cells of M. paraffinicum, which utilize n-alkanes, increases drastically, as compared to cells that are incubated in a beef-extract or carbohydrate medium.

There is also a virulent variant, the so-called pyocyaneus bacillus, that is referable to the species Pseudomonas aeruginosis, whose representatives actively oxidize n-alkanes and are usually present in oil-polluted areas; this bacillus elicits suppurative skin lesions, producing the blue pigment, pyocyanin. There is also production of pyocyanin during development of paraffin-oxidizing strains of Ps. pyocyanea on media with n-alkanes [16].

Studies of the yeast flora of the North Sea in the area of the Amoco Cadiz tanker accident revealed [23] that petroleum depresses the normal yeast flora

of the sea and, after spills thereof, Candida guillermondii is among the prevalent species. This species, like other representatives of the genus Candida, oxidizes n-alkanes well. However, C. albicans, the pathogen of skin and mucosal lesions (candidiasis), is also referable to this genus.

Thus, petroleum paraffins per se are not toxic substances and utilization thereof by microorganisms proceeds rather smoothly, if environmental factors do not have an inhibitor effect on it. However, pollution by these hydrocarbons causes a change in the microbial cenosis in the direction of prevalence of saprophytic mycobacteria, pseudomonads and yeast of the genus Candida. We still have no data about the virulence of paraffin-oxidizing microflora. This aspect should become the subject of close scrutiny by medical microbiologists and hygienists.

Cycloalkanes are saturated hydrocarbons; however, they have no methyl groups that are readily attacked by oxygenases. These compounds resist microbiological oxidation more than n-alkanes with the same number of carbon atoms in the chain. Cycloalkanes are oxidized by the same groups of microorganisms as hydrocarbons with an open chain, i.e., by saprophytic mycobacteria, pseudomonads, some yeast and fungi. It has been demonstrated [26] that saprophytic mycobacteria that utilize n-alkanes grew well even on media with alkyl-substituted cycloparaffins if the aliphatic chain was long enough; methyl- and ethyl-cyclohexanes were not oxidized; ω-cyclohexyl-substituted fatty acids, which were then formed, were used in constructive metabolism. In soil, water and sea-bottom deposits there are microorganisms capable of oxidizing cyclohexanes with an open ring [52]. Perry [45] examined different routes of oxidation of these compounds by pure and mixed cultures of microorganisms. Some microorganisms form, as an intermediate product, an aromatic compound--para-hydroxybenzoic acid. Processes of conjugate oxidation, in which representatives of the genus Pseudomonas are very important, play an appreciable part in the destruction of cyclohexanes. Thus, enrichment of liquid sewage with cycloalkanes led to prevalence of pseudomonads in the microflora [27].

Thus, cycloalkanes (particularly polycyclic ones) disappear more slowly from the environment than hydrocarbons with an open chain. Since the systematic composition of microflora that oxidizes this group of hydrocarbons is the same (on the genus level), all of the discussion concerning possible virulence of paraffin-oxidizing microflora also applies to cycloalkane-oxidizing organisms.

Aromatic hydrocarbons and their derivatives get into the environment as a result of man's agricultural work, oil pollution, as well as in sewage. This is the most dangerous group of substances from the standpoint of effects on living organisms. Aromatic compounds differ from hydrocarbons with open chain and cycloalkanes in that they dissolve better in water. For them to enter the bacterial cell the presence of hydrophobic external layers or canals is not mandatory. After penetrating into cells, aromatic hydrocarbons impair membrane permeability and block the action of a number of enzymes, i.e., they are toxic to cells. Suffice it to state that many pesticides, insecticides and other substances with destructive effects are based on aromatic compounds. As an example, we can mention the well-known carbolic acid (phenol), which is used as a disinfectant, as well as the insecticide, DDT (dichlorodiphenyltrichloroethane).

Physicochemical factors (oxidation, photolysis, hydrolysis) play a more significant part in destruction of aromatic hydrocarbons than in degradation of paraffins or cycloparaffins. Thus, 76-87% of the phenanthrene in a water reservoir was degraded in 4 weeks at a temperature of 25°C; breakdown referable to physicochemical factors constituted 45% [50].

In spite of the high toxicity of aromatic hydrocarbons and their derivatives, there are microorganisms in nature that are capable of degrading them. They are diverse bacteria--representatives of the genera Nocardia, Pseudomonas, Xanthomonas and others--as well as some fungi [37, 53, 54]. For example, the microscopic Sporotrichum pulverulentum fungus splits 1,2,4-trioxybenzene with ring cleavage and production of β-ketoadipic acid [30]. However, the concentrations of aromatic compounds used to study microbiological degradation are tens and hundreds of times lower than in the case of microbial degradation of n-alkanes. Microorganisms that develop in a paraffin film covering the water surface are used for oxidation of n-alkanes, whereas for degradation of the herbicide 2M-4X (2-methyl-4-chlorophenoxyacetic acid) by microorganisms concentrations of 300 mg/ℓ are used [10]. Microbiological degradation of aromatic compounds is extremely slow and occurs at different intensities with different "arens" [?]. Polyaromatic hydrocarbons are among those that are degraded slowly, and the more rings in the molecules, the greater their resistance to biodegradation [34, 50].

Cooxidation processes play an enormous part in utilization of aromatic hydrocarbons. Degradation of these compounds is easier in a mixed population of microorganisms, as well as in the presence of other organic compounds. The degree of oxidation of gasoline by an association of microorganisms is greater than by separate elements of pure cultures [35]. Authors properly attribute this effect to cooxidation processes. Hydrocarbons that are resistant to biodegradation (for example, polyaromatic ones) nevertheless disappear from the environment due to breakdown in the presence of conjugate oxidative reactions [46]. However, this process does not occur at low temperatures (5°C) [50].

As we have noted above, microflora that oxidizes paraffins is a normal element in unpolluted ecosystems, which is the reason why biocenoses have a high capacity for self-purification to remove these compounds. This cannot be said about aryl-oxidizing microflora. There is slow adaptation to oxidation of aromatic compounds and breeding of active strains. A comparative study of the rate of degradation of fluorene and anthracene by microflora of polluted and unpolluted salt water revealed [39] that, while it constituted 0.04 and 0.07 μg/ℓ/h in the former case, these compounds were not degraded at all in the latter.

Microbiological degradation of toxicants based on aromatic compounds is not always complete, i.e., with splitting of the nucleus, and could lead to accumulation of products that are more toxic than the original ones. Thus, in the case of breakdown under cooxidation conditions of the herbicide, propanide, by a culture of Pseudomonas aurantiaca, 3,4-dichloroaniline accumulated in the medium [3]. Oxidation of aromatic hydrocarbons is not a property of a genus or even species of microorganisms, as is the case with n-alkanes. There are few microorganisms that degrade aromatic hydrocarbons in pure culture, in

the absence of other organic compounds, and they vary in systematic position. They can probably be viewed as spontaneous mutants. The structure of membranes and enzymatic systems of such microorganisms merits careful investigation. The capacity to oxidize aromatic toxicants should be viewed as a unique property.

Thus, contamination with aromatic hydrocarbons does not lead to profuse development of specific systematic groups of microorganisms. Against the background of a general depressing effect, strains appear that are capable of degrading toxicants. This is why we do not need to discuss, in this case, the virulence of the microflora. In assessing the ecological consequences of microbiological degradation of aromatic hydrocarbons, we must mention the possible accumulation of products of incomplete decomposition, which have toxic and mutagenic effects.

With reference to the extent and degree of pollution with petroleum and petroleum products, it must be borne in mind that these pollutants consist of different components that differ in toxicity. While paraffins are an organic substrate that is readily oxidized by the normal microflora of a biocenosis, aromatic hydrocarbons are toxic for most microorganisms. Inclusion of the latter in the natural cycle of matter is a lengthy, complicated and morbid process for the microbiocenosis.

At the present level of development of science, it is imperative to use a differentiated approach to assessment of oil pollutants, i.e., it is important to know the amounts of different types of hydrocarbons, primarily aromatic ones. On the other hand, the usual overall count of cells of hydrocarbon-oxidizing microorganisms is also not enough. It is necessary to make a competent determination of the systematic composition of microflora, at least on the genus level. The study of data obtained in this manner will permit more accurate prediction of hydrocarbon degradation in natural biocenoses and related ecological consequences.

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CSO: 1840/299

ELECTROMAGNETIC THERAPY

Riga SOVETSKAYA LATVIYA in Russian 30 Jul 82 p 2

[Article by A. Il'icheva: In the Scientists' Laboratories. Therapy with Biomechanics]

[Text] Many well-known physicists and mathematicians are among the men of science who have tried to apply mechanics to biology. In our time biomechanics has developed at the interface of these two sciences, becoming a routine thing in the daily research of many scientific laboratories in the country. Biomechanics, which involves the mutual interaction of several sciences, including physics, has also become a profession for physicians and biologists. In the [Latvian] republic, research in this direction is being conducted at the Institute of Polymer Mechanics of the Academy of Sciences of the Latvian SSR and by the Latvian Scientific Research Institute of Traumatology and Orthopedics. Each of these institutes has a unit which studies various aspects of the properties of bone tissue and blood vessels.

From the point of view of the scientist-engineers, whose work is headed by Doctor of Technical Sciences I. Knets, a pupil of Academician A. Malmeyster, bone, muscle and blood vessel walls are the solid media which have the most mechanical characteristics. Biological solid media are subject to the same laws of conservation of mass and motion and balance of energy as any engineering materials. Changes in the mechanical properties of materials can be considered and expressed by mathematical formulas and equations.

The structure and strength of bones has been long and thoroughly studied, both here and abroad. The elastic characteristics of bone have been studied fairly accurately at the Institute of Polymer Mechanics as early as eight years ago, using various methods such as seismic, x-ray and ultrasound. Mathematical models of loading diagrams of individual bone elements were constructed. Work was undertaken on the creation of artificial structural materials with structure identical to that of bone tissue.

In the days before engineers became involved in bone surgery, it did not occur to physicians doing a bone transplant to use a homotransplant, corresponding it its internal structure to the patient's bone. For bone is a natural polymer with spiral structure, and it is important to the organism which way the loops of the spiral are directed.

For many years the biomechanics department of the Latvian Institute of Traumatology and Orthopedics under the direction of Doctor of Medical Sciences Kh. Yanson, has been studying the application of biomechanics to the treatment of fractures of the tibia, in order to find effective methods of treating this most common type of trauma.

Together with coworkers at the Institute of Polymer Mechanis, new types of metal pins were created to join fracture sites, consideration being given to the mechanical characteristics of the metal being used and of the bone itself. Experiments were also conducted on experimental animals, graphs were drawn and elasticity modules alculated for different types of bone callous formed at the fracture site. The purpose of all this, the sum total of complex studies equipped with an extensive arsenal of electromechanical, automated and semiconductor devices, is the struggle for h man health.

In recent years both of these institutes have strengthened their creative cooperation even more during work on one of the complex scientific and technical programs of the republic. Attention has been concentrated on clarification of the restoration (regeneration) of bone tidsue under the influence of various physical fields. The question has been actively studied by physicists and engineers both here and abroad. Magnetotherapy for restoring tissues has steadily interested traumatologists, surgeons, cardiologists, neurophthologists and ophthalmologists. Na ure itself suggested the direction of this research. Indeed, all animals have the capacity to a greater or lesser degree to regenerate lost or damaged organs and tissues.

Biomechanics specialists have studied fairly thoroughly and in detail the mechanical properties of bone tissue, blood vessels, and the sclera of the eye under normal and pathological conditions. This became the basis for further cooperative work with physicians on the creation of several methods of stimulating tissue regeneration. Low-frequency electromagnetic fields became the main factor here. Electromagnetic stimulators were designed and made.

Electromagnetic stimulators are also used now for the treatment of fractures of the tibia together with other, more traditional methods.

Clinical trials of new electromagnetic devices are going on not only in our republic, but also in specialized clinics in Moscow and Leningrad. Results are confidently expected. The electromagnetic field alleviates pain and relieves the edema usually accompanying fractures, and improved circulation. X-rays show that after 2-4 weeks of treatment, bone tissue is well formed at the trauma site.

It is difficult to predict the future possibilities of magnetotherapy. They may be completely unexpected. Today it is known that magnetotherapy is effective for treatment of infected fractures, for the prophylaxis of pathological changes in various tissues of the living organism in people confined to bed for a long time, for prostheses of extremities consisting of artificial polymer materials and for the treatment of blood vessel pathology and so on.

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SCIENTISTS DISCUSS ROLE OF GENETIC ENGINEERING

Moscow LITERATURNAYA GAZETA in Russian 30 Jun 82 p 10

[Interview with A. Bayev, G. Georgiyev, V. Debabov, Ye. Sverdlov, K. Skryabin and S. Shestakov by L. Khar'kova: "Genetic Engineering: Laboratory, Shop, Field"]

[Text] One of the tasks posed by the Food Program to Soviet science is quite different from the rest in a certain sense: A document adopted by the May Plenum of the CPSU Central Committee states the need for developing theoretical research on the problems of genetic engineering associated with selection of plants, microorganisms and animals, with the biotechnology of protein synthesis and with biologically active substances."

Genetic engineering entails artificial reconstruction of the hereditary material of living organisms with the purpose of creating new qualities useful to man. Not all that long ago this appeared fantastic. Today, however, the associated scientific research is being called for as a routine matter by this highly important state document. It calls for not only theoretical research but also practical developments having the purpose of promoting further development of agriculture, microbiological industry and other sectors of the national economy.

One of the recent meetings held in the Central Lecture Hall of the All-Union "Znaniye" Society on the eve of the eighth congress of this society (which convenes on 5 July in Moscow) was devoted to Soviet and foreign research in genetic engineering and biotechnology. Being unable to present the full text of the statements given by the scientists, we decided to publish only their answers to questions from the audience. From our point of view the most interesting and important items of the multifaceted discussion were concentrated namely in these questions and answers.

The participants of the discussion on the problems of genetic engineering included: A. Bayev, academician, secretary of the Division of Biochemistry, Biophysics and Chemistry of Physiologically Active Compounds, USSR Academy of Sciences; USSR Academy of Sciences Corresponding Member G. Georgiyev; Doctor of Biological Sciences V. Debabov; Doctor of Chemical Sciences Ye. Sverdlov; Doctor of Biological Sciences K. Skryabin; Doctor of Biological Sciences S. Shestakov.

Question: Is it right to say that what we refer to as biotechnology arose relatively recently, in our times? After all, man has been using various biochemical processes for his own needs since time immemorial. Is is correct to think that the only difference lies in the increase of several orders of magnitude in the scale of such use?

A. Bayev: This is not quite the case. True, people have been using various biochemical processes since ancient times, in baking, in winemaking, in acquisition of fermented milk products and so on. Following the discovery of microorganisms, we began using them for various industrial purposes, to produce food. It was recently, however, that genetic engineering and cellular engineering became a part of this industrial microbiology and industrial biochemistry. A new technology--biotechnology, which has enormous prospects for development--is precisely what came into being.

V. Debabov: Microbiological industry was created and is now developing in our country. Its main objective is to produce valuable substances for agriculture, nutrient protein primarily. It is scarce today, as we know. To correct for this scarcity we add fish meal, meat and bone wastes and soy to feed. Addition of soy is a highly effective means of compensating for a protein shortage. It is extensively used in countries of West Europe and in the USA. But here in our country, soy is not abundant owing to the climatic conditions, and its use as a feed additive is limited. This is where genetic engineering comes to the rescue. In particular, we have created strains--that is, special forms of bacteria--possessing the needed properties, which then began synthesizing the proteins we need. Today our microbiological industry is producing a protein-vitamin concentrate for the needs of animal husbandry. Last year its production totaled millions of tons. And it will constantly increase. In principle, we will be able to compensate for the shortage of nutrient protein in agriculture in the not-too-distant future.

Besides protein, we are producing individual amino acids, which are also being added to animal feed. Work in this direction is proceeding on a broad front throughout the entire world. In 3 years our country has created a highly effective laboratory strain producing one of the most important amino acids--threonine. Its addition to animal feeds produces a colossal impact. As an example 0.1-0.3 percent produces a weight gain in farm animals totaling 15-20 percent. One ton of threonine is equivalent to 50 tons of grain. No more need be said.

We are also producing antibiotics to prevent animal infections, and bacterial plant protection resources. The principal merit of such resources is that

in contrast to chemicals, they act selectively--that is, they annihilate only the pests. We can rest easy about the fate of useful insects. These resources are being used successfully, in particular, against various forest pests.

It should be stated, however, that despite the high effectiveness of bacterial protection, unfortunately it is still not used to a sufficient extent. Why? First of all, chemical agents are still cheaper, and second, highly sophisticated agricultural practices are required: Biological resources must be employed cautiously, in strictly indicated doses, at certain times of the day. The task of biological protection is not to totally annihilate a certain species of insects but only to reduce its numbers without disturbing the ecological balance.

S. Shestakov: Let me cite two examples of solving yet another important problem--acquiring, with the help of microbiological synthesis, vaccines and agents for diagnosing diseases of agricultural animals and plants. The basis for getting large amounts of vaccine for foot and mouth disease, outbreaks of which, as we know, do enormous harm, has been created in the FRG and the USA. The department of virology of Moscow State University is developing the methods of mass immunodiagnosis of viruses of agricultural plants jointly with the Institute of Molecular Biology. A particular target is potatoes, which are infected by many species of viruses and fungi. We hope that series production of antiserums against potato viruses based on the use of the methods of genetic engineering will make it possible to solve, in the shortest time, the problem of obtaining virus-free planting material, sharply raise the yields, improve quality and increase potato storage life.

Problems of no lesser importance face genetic engineering in terms of the plants themselves. There can be no doubt that in the future it will become possible to obtain new varieties of agricultural plants resistant to diseases and to unfavorable climatic conditions, plants containing protein of better quality, and plants possessing combinations of characteristics which cannot be obtained by hybridization and selection. Genetic engineering is good because in principle, it will make it possible to surmount the biological barriers existing in the case of hybridization of different organisms.

I could produce an impressive list of the tasks in agriculture to which genetic engineering could make a contribution, but I will limit myself to just one having exceptionally important significance. This is the problem of so-called biological nitrogen fixation.

The problem is that chemical fertilizer production has now grown into a gigantic and expensive sector consuming an enormous quantity of energy and unrenewable natural gas resources. At the same time, inefficient use of nitrogen fertilizers (a plant consumes not more than 30-50 percent of what is introduced into the soil) results in erosion of the soil, contamination of water basins and the atmosphere and disturbance of the ecological balance.

Capitalization upon nitrogen fixation in place of the use of mineral nitrogen fertilizers would mean transition to an economically and ecologically more advantageous agricultural practice.

What is the problem? A number of plants (peas, soy, alfalfa etc.) live in symbiosis with nodule-forming bacteria that fix (assimilate) nitrogen from the air, transform it into amino acids and then transport it into the plant. However, most agricultural plants do not possess such bacterial satellites. Therefore we need to first of all improve the symbiotic systems of leguminous plants, and secondly we need to create new systems of nitrogen fixers that could "service" wheat, rice, sugar beets, corn, vegetables and industrial crops. These tasks are fully realistic, though they are not simple.

Question: Can genetic engineering make a contribution to solving the energy problem?

S. Shestakov: Perhaps. Take at least the following problem as an example. Some so-called photosynthesizing bacteria liberate hydrogen which, as we know, is the most economical fuel. And naturally the question arises: Can we not "capture" this hydrogen and utilize it for industrial purposes? Thus genetic engineers and biotechnologists have been saddled with yet another important task--improving microorganisms with the purposes of creating biotechnical systems with which to acquire hydrogen. In France for example, the first step has been taken to create an experimental biological reactor.

Question: The importance now being attached in all the world to interferon is well known. Can genetic engineering facilitate its acquisition?

Ye. Sverdlov: The prospects of using interferon in medicine are apparently unusually broad. This is essentially a universal resource against viral diseases.

But the whole misfortune is that human interferon is the most effective. It is isolated primarily from the blood of donors, in very small amounts for that matter. Someone calculated that we would need the blood of all mankind to satisfy just the needs of our institute--both research and therapeutic needs. We are now beginning to search for other sources of interferon. There are several of them. In our opinion the most promising path is offered by genetic engineering. We are now making an effort to improve the corresponding method. There is still much work to do, but genetic engineering has already produced a method that is cheaper to use than that of acquiring medicine from donor blood.

Question: What is the status of obtaining insulin?

Ye. Sverdlov: Of course, insulin is no less important than interferon: After all, the condition and well-being of many thousands of diabetics depends on it. Today this disease is treated with bovine insulin, but there are many people who reject animal insulin--they need human insulin. Using the methods of genetic engineering, we have already obtained a bacterium capable of synthesizing such insulin, and the efforts to synthesize insulin are proceeding on a broad scale.

Question: Could you possibly cite an example of where genetic engineering can compensate for the "failings" of nature?

K. Skryabin: Growth hormone would be one example. In the presence of some diseases, a child's hypophysis produces an insufficient quantity of such hormone. There is the danger that the child would grow into a Liliputian. Thus the hormone would have to be introduced artificially. How is it obtained today? Hypophyses are taken from deceased persons, and growth hormone is isolated from them.

Genetic engineering allows us to solve this problem in simpler ways. It was discovered in the laboratory that growth hormone may be synthesized by human E. coli. Modifications of this bacterium which produce growth hormone in sufficient quantity have now been obtained.

Question: What does genetic engineering have to offer to research on the nature and treatment of cancer?

G. Georgiyev: Genetic engineering has produced a unique sort of revolution in research on the mechanism behind arisal of tumors and on the mechanism of transformation of a normal cell into a tumor cell. A number of tumors are known to be of viral origin. And so, these viruses were studied with the help of genetic engineering, and it was found that there is one gene in the cell which, once it goes into action, can transform a normal cell into a tumor cell, and limit its functional performance.

We have now revealed about a couple of dozen viruses that help genes transform a cell into its tumorous version. We have also revealed "pathogenic" genes and the proteins that are synthesized by these genes. Presence of just a small quantity of such a protein in the cell would be sufficient to cause it to duplicate uncontrollably.

It was found out later on that such genes, or oncogenes as they are called, are present in all human cells. Moreover their products are utilized by the body in a certain stage of development. But in this case their work is always under control. However, if an oncogene gets out of control, a large quantity of protein would be produced as a result, and the cell would become a cancerous cell. What can make a cell go out of control in this way? One of the assisting factors is viruses.

Many tumors are associated not with viruses but with alteration of the genetic apparatus. There may also be other mechanisms responsible for activation of oncogenes. At the moment we have only a partial understanding of these mechanisms.

What does this mean for the future? If we know precisely what protein is produced by cells, we could find specific substances capable of suppressing protein activity. In other words, we can learn to undertake a purposeful attack on a tumor without suppressing all tissues of the body, as is done today by means of the known chemotherapeutic preparations.

Question: What did American geneticists have in mind when they declared that they were halting research in genetic engineering?

A. Bayev: This did in fact happen in the early 1970s. The apprehension was stated that as a result of genetic manipulations, pathogenic microorganisms might be accidentally created. A moratorium was proclaimed over further research. But the work did not stop altogether. It became clear in the course of the experiments that it is impossible for pathogenic organisms to appear accidentally. Though of course, they may be produced if such an end is desired.

Ye. Sverdlov: True, there were many apprehensions when genetic engineering was just getting up on its feet. With time, however, it became clear that artificially created microorganisms entering an alien organism are significantly less viable than natural microorganisms. As a rule they cannot exist outside the laboratory.

V. Debabov: We have developed a special safety procedure in our plants and laboratories. Scientists are working with bacteria that are absolutely harmless to man.

There is another problem that now troubles us: Will we be able to apply the achievements of genetic engineering to the national economy quickly enough?

Question: Where are genetic engineers trained? Does this specialty exist in VUZs?

S. Shestakov: We have been talking about genetic engineering for 10 years already, but there is no such specialty in the VUZs yet. Geneticists, virologists, biochemists and specialists in organic chemistry are working in this area. It is entirely obvious, meanwhile, that we do need genetic engineers as such.

It would be sufficient to point out that the European Federation of Biotechnology plans to use about 30 percent of the assets allocated to it for genetic engineering namely to train personnel. We also need to organize some sort of centralized integrated training process in biotechnology.

This is precisely the path being taken by the biology department of Moscow State University, the graduates of which make up the lion's share of those who are now working in genetic engineering.

The objective difficulty is that practical assimilation of the methods of genetic engineering requires expensive equipment and reagents which are not always available to educational institutions. One of the ways of solving this problem is to unite the efforts of workers in the higher school and the research, academic and applied institutes having the necessary material-technical base.

In any case to solve the problems associated with the Food Program, we need qualified specialists. "Soviet scientists," noted L. I. Brezhnev in his report to the May (1982) Plenum of the CPSU Central Committee, "have done much to improve agriculture. But that which could have satisfied us yesterday will clearly be insufficient tomorrow, and even today. This is the thought upon which science must base its efforts." The training of genetic engineers and introduction of the achievements of genetic engineering into practice are among such unpostponable problems.

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UDC 577.158.54

FIREFLY (LUCIOLA MINGRELICA) LUCIFERASE: SIGNIFICANCE OF SUBUNIT INTERACTION IN ENZYME ACTIVITY AND THERMAL INACTIVATION

Moscow BIOKHIMIYA in Russian Vol 47, No 5, May 82 (manuscript received 30 Mar 81) pp 760-766

BROVKO, L. Yu., BELYAYEVA, Ye. I. and UGAROVA, N. N., Chemical Faculty, Moscow State University imeni M. V. Lomonosov

[Abstract] Studies on luciferase (LF) isolated from the firefly Luciola mingralica showed that only the dimerized form was active. The dissociation constants for the monomer-dimer system at pH 7.0-8.4, 15-35°C, was ca. 13 nM in $MgSO_4$ and 4.3-5.2 nM in Na_2SO_4. At low salt concentrations the rate of LF inactivation by heat increased sharply as the concentration of the enzyme decreased, while at high salt concentrations the rate in inactivation was independent of LF concentration due to the greater stability of the monomers than of the dimers. At pH 7.8, stability of the monomeric subunits decreased, while that of the dimers increased. Figures 4; references 10: 4 Western, 6 Russian.
[360-12172]

UDC 614.777:579.68(26.03)(47+57)(048.8)

CURRENT ASSESSMENT OF BACTERIAL AND VIRAL CONTAMINATION OF COASTAL WATERS

Moscow GIGIYENA I SANITARIYA in Russian No 3, Mar 82 (manuscript received 3 Nov 80) pp 57-60

BONDARENKO, V. I. and POPOVICH, G. G., Kiev Scientific Research Institute of Epidemiology, Microbiology and Parasitology

[Abstract] Evaluation of worldwide findings on contamination of coastal waters with bacterial and viral enteric pathogens shows that the level of contamination at the present time appears to exceed the self-purifying abilities of the waters in many locations. The problem stems from indiscriminate industrial and domestic discharge of waste waters into the sea, as well as wastes from ships. It is evident that a real threat exists of enteric infections borne by marine waters. References 57: 2 Ukrainian, 19 Western, 36 Russian.
[321-12172]

UDC 631.461:577.4

VOLUME OF BACTERIAL CELLS IN SOILS OF CERTAIN ZONAL ECOSYSTEMS

Moscow BIOLOGICHESKIYE NAUKI in Russian No 4, Apr 82 (manuscript received 26 Jun 81) pp 45-47

BOGOYEV, V. M., Department of General Ecology and Hydrobiology, Moscow State University imeni M. V. Lomonosov

[Abstract] For a clear picture of bacteria in a biomass, information on the volume of bacterial cells--a little studied topic--is needed. Soils of four types of ecosystems were used--taiga, oak-woods, prairie-steppe and desert. The authors studied soddy podzolic soil at the Valday hospital in Novgorod Oblast (taiga), dark-gray forest soil (oak-woods) in Voronezh Oblast, steppe chernozem of the Central-Chernozem Preserve in Kursk Oblast (prairie), and sandy desert soil of the Repetekskiy Preserve in the Eastern Karakums (desert). Data showed the greatest average volume of bacterial cells to be in chernozem steppe soil, with the least in sandy desert soil.

Based on the Student t-distribution criterion, the data were judged to be statistically significant for comparing chernozem to all the other soils, but not significant for comparing differences between the other three soils. The presence of organic matter and moisture was regarded as the key variable. References 8: 7 Russian, 1 English.
[298-12131]

UDC 577.472(28)

INTERACTIONS WITHIN BARNACLE POPULATIONS IN FOULING COMMUNITIES

Moscow ZHURNAL OBSHCHEY BIOLOGII in Russian Vol 43, No 3, May-Jun 82 (manuscript received 14 Aug 80) pp 419-425

BRAYKO, V. D., Institute of Biology of the Southern Seas, Ukrainian SSR Academy of Sciences, Sevastopol'

[Abstract] Biological, physiological, and biochemical criteria were used to evaluate the effects of crowding in intra- and interspecies interactions of barnacle in fouling communities and in pure culture. The results showed that in pure cultures most of the specimens (90%) survived for 8-9 months, irrespective of the crowding factor. In mixed communities the survival time was only 3-4 months by comparison due to predation and competition for food. In crowded situations the production of eggs by Balanus improvisus barnacles was decreased, but the number of clutches within a time period was increased leading to an increase in the number of generations produced. Figures 3; references 10: 3 Western, 7 Russian.
[338-12172]

UDC 58:778.35(282.5:575.4)

EVALUATION OF CHANGES IN PLANT COVER IN KARAKUM CANAL REGION BY REPEATED AERIAL PHOTOGRAPHY

Ashkhabad IZVESTIYA AKADEMII NAUK TURKMENSKOY SSR: SERIYA BIOLOGICHESKIKH NAUK in Russian No 1, Jan-Feb 82 (manuscript received 24 Jan 80) pp 13-18

[Abstract] Aerial photographs taken in 1965 and 1976 were used to study changes in the plant cover of the desert surrounding the Karakum Canal. The photographs revealed changes in the plant communities under the influence of human activity and natural processes. Maps and criteria are provided for the interpretation of the panchromatic photographs. Figures 2; references 7 (Russian).
[379-12172]

UDC 599.32+591.91(584.1)

NEW SIGHTINGS OF AFGHAN FIELD MOUSE (MICROTUS AFGHANUS THOMAS) IN REGION OF KARAKUM CANAL (SOUTH-EASTERN TURKMENIA)

Ashkhabad IZVESTIYA AKADEMII NAUK TURKMENSKOY SSR: SERIYA BIOLOGICHESKIKH NAUK in Russian No 1, Jan-Feb 82 (manuscript received 7 Jul 80) pp 62-64

MARININA, L. S., Institute of Zoology, Turkmen SSR Academy of Sciences

[Abstract] New findings are reported of the Afghan field mouse (Microtus afghanus Thomas) in the South-Eastern Karakum deserts in the vicinity of the Karakum Canal. This indicates that this species has spread from the Murgab oasis further to the north. Figures 1; references 11 (Russian). [379-12172]

UDC: 576.895.42:576.85

IMMUNE REACTIONS OF ORNITHODOROS PAPILLIPES TICKS TO INTRODUCTION OF DIFFERENT MICROORGANISMS (ARGASIDAE)

Leningrad PARAZITOLOGIYA in Russian Vol 16, No 3, May-Jun 82 pp 238-241

[Article by V. M. Podboronov, V. M. Bondarenko and V. V. Yevdokimov]

[Text] It has been demonstrated that ticks have protective cell factors that capture and digest different microorganisms on the order of phagocytosis. In response to introduction of bacteria in tick hemolymph there is an increase in amount of lysozyme, which has bactericidal action. Persistence of phage particles for 1-2 months was demonstrated after injection of phage FX-174 into tick hemolymph. Specific antibodies in response to the administered phage corpuscles were not demonstrable.

It is important to investigate factors of natural resistance of ticks to various pathogenic bacteria from both the standpoint of general biology and epidemiology, since the organism of arthropods is the habitat and site of persistence of some pathogens of communicable diseases (Pavlovskiy, 1940; Gromashevskiy et al., 1972; Grokhovskaya et al., 1975).

We demonstrated previously that there are nonspecific humoral factors in ticks, which are attributable primarily to bactericidal effects of lysozyme, and a study was made of whether it was possible for bacteria to persist in ticks after being fed such bacteria (Podboronov et al., 1978).

Heretofore no specific cellular structures have been found in ticks that could perform the function of producers of specific antibodies or have phagocytic activity, which has been found, for example, in a number of insects. Relatively recently, one of the most sensitive methods was developed for seroimmunodiagnostics, which permits demonstration of up to 10^{-4} antibodies in serum (Skvortsov, Bondarenko, 1971). We found no works in the available literature pertaining to in vitro isolation of tick hemolymph cells in order to study their phagocytosis function. No studies were made of the dynamics of persistence of bacteria injected parenterally in tick hemolymph or dynamics of effects of lysozyme with this method of infecting ticks.

Our objective here was: 1) to determine the presence or absence of specific humoral reactions in Ornithodoros papillipes ticks using the most sensitive

method for demonstration of antibodies and the process of interaction of hemolymph cells cultivated in vitro with different bacterial species; 2) study of survival of bacteria injected to ticks parenterally, into hemolymph; 3) study of dynamics of effects of lysozyme on bacteria with this method of infecting ticks.

Material and Methods

Experiments were conducted on 1020 hungry adult Ornithodoros papillipes ticks. The ticks were infected with Micrococcus lysodeikticus No 2665, Staphylococcus aureus No 209, Salmonella typhimurium LT-2 and S. typhimurium No 145, as well as phage FX-174. The choice of strains of bacteria was determined by differences in sensitivity to lysozyme: M. lysodeikticus 2665, St. aureus 209 are sensitive to lysozyme, while S. typhimurium LT-2 and 415 are resistant. Phage FX-174 had been used previously to demonstrate antibodies (Skvortsov, Bondarenko, 1971).

Bacterial suspensions in a dosage of 10^7 and phage in concentrations of 10^6 and 10^{12} were injected in a volume of 0.05 mℓ in tick hemolymph by the method described by Sidorov et al., 1967. In the case of administration of bacteria, bactericidal activity of hemolymph was examined after 6, 12, 24, 36, 48 and 72 h, as well as after 5-10-15-20-25 and 30 days; at the same times we checked survival of bacteria injected parenterally in hemolymph. Presence of specific antibodies in hemolymph to phage FX-174 was tested 6-12-18-24-30-60 days after "immunizing" ticks with live phage corpuscles. We determined the capacity of ticks to produce specific antibodies by the method described by Skvortsov and Bondarenko (1971). Hemolymph samples of 2 μℓ per tick were collected 6, 12, 24, 36, 48, 72 h, as well as 5-10-15-20-25 and 30 days after administration of bacteria and phage; we added to it 2 μℓ 0.85% NaCl solution; the mixture was applied to a slide and smears were prepared to count hemolymph cells. We counted all cells on each slide and determined the quantity thereof per mℓ hemolymph. Smears were fixed with methanol and stained according to Giemsa. We paid attention to the capacity of cells to phagocytize bacteria injected in tick hemolymph. We took 10 ticks for each variant.

We then determined viability and reproducibility of bacteria in ticks. For this purpose we counted viable bacterial cells by plating hemolymph in beef-extract agar. The quantity of phage particles was titrated on an indicator strain of E. coli K_{12} and counted negative plaques in the dish with beef-extract agar.

Antibacterial activity of tick lysozyme was determined by a previously described method (Podboronov et al., 1978). Lysozyme was tested with M. lysodeikticus acetone powder preparation added to dishes with biphthalate agar. Tick hemolymph was frozen, thawed and centrifuged.

Results and Discussion

In the first series of experiments, we tested tick reactions to different doses of phage FX-174. The results revealed that a drastic decline of phage titer is observed by the end of the 6th day after administration. Thus, when

ticks were infected with a dosage of 1×10^6, the number of phage particles dropped to 10 after the above time. Subsequently, phage persisted without decrease in number of corpuscles up to the 12th-18th days. Phage was eliminated only by the end of 1 month (Figure 1).

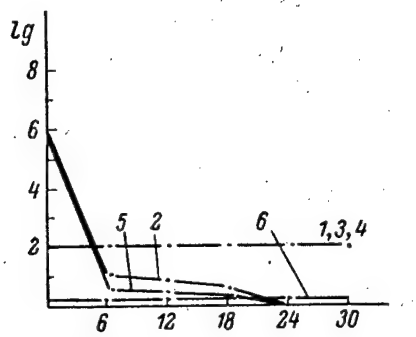

Figure 1.
Curve of change in number of phage particles in O. papillipes ticks with burden of 10^6 per tick. X-axis, day of observation

1) phage + healthy tick homogenate + 0.1 mℓ E. coli
2) phage + "immunized" tick homogenate + 0.1 mℓ E. coli
3) phage + 0.1 mℓ E. coli
4) phage + healthy tick homogenate + 0.1 mℓ E. coli
5) control for retention of phage in "immunized" ticks
6) control of culture for production of spontaneous phage

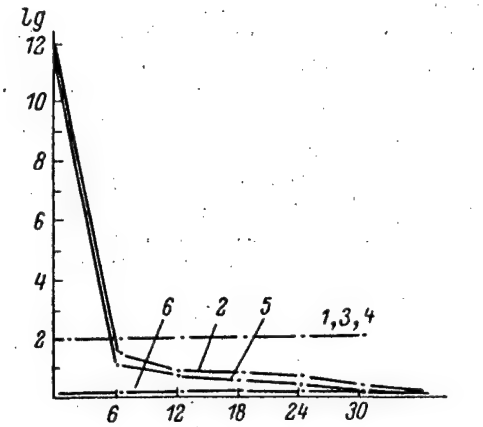

Figure 2.
Curve of change in number of phage particles in O. papillipes ticks with burden of 10^{12} per tick.

Designations are the same as in Figure 1.

When ticks were infected with a dose of 1×10^{12} the dynamics of phage persistence differed somewhat, but did not differ appreciably from a dosage of 1×10^6. As can be seen in Figure 2, by the end of the 6th day the number of phage particles also dropped to about $1\text{-}2\times10^1$. On the 18th, 24th and 30th days, isolated phage particles were found, and none was demonstrable in ticks only by the end of the 2d month. In the group of control ticks, which were not infected with virus, no phage plaques were demonstrable.

Thus, it was established that, when introduced into tick hemolymph, phage FX-174 is demonstrable for a long time, at least 1-2 months. On the other hand, the significant decline in number of phage particles injected in tick hemolymph was indicative of presence of factors in ticks that influenced elimination of viruses. We examined ticks for presence of specific antibodies that, perhaps, neutralize phage corpuscles, in order to determine the mechanism of phage elimination. Use of the reaction of phage neutralization with controls (control for retention of phage in "immunized" ticks) revealed that even ultramicroscopic amounts of antibodies to bacteriophage FX-174 were not demonstrable.

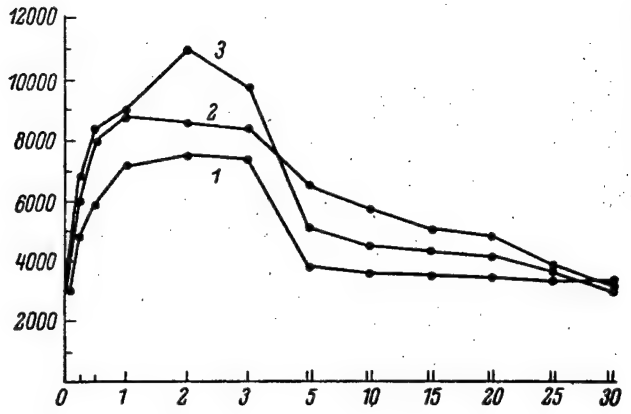

Figure 3.
Curve of change in number of hemolymph plasmocytes (per mℓ) in O. papillipes ticks infected with Micrococcus, Staphylococcus and Salmonella/
X-axis, day of observation; y-axis, plasmocytes per mℓ hemolymph
1) ticks infected with Micrococcus lysodeikticus 2665
2) ticks infected with Staphylococcus aureus 209
3) ticks infected with Salmonella typhimurium LT-2

In the next series of tests we studied bacterial survival in ticks. When ticks were infected with bacterial cultures of M. lysodeikticus 2665, Staphylococcus aureus 209 and S. typhimurium LT-2 in a dosage of 10^7 microbial bodies per tick we observed rapid death of bacteria within the first postinfection hours and total destruction thereof after 12, 24 and 10 days, respectively. S. typhimurium 415 bacterial strain, which is virulent to mice, also had a lethal effect on ticks, causing death within 24 h.

It was of special interest to examine nonspecific protective humoral reactions of ticks to administration of the above-mentioned bacteria. As in our previous studies (Podboronov et al., 1978), we observed an analogous effect of lysozyme on administered bacteria. In response to bacterial infection, there was a drastic increase in lysozyme concentration in ticks within the first 24 h; it held at a high level up to 72 h and then gradually declined.

The dynamics of bactericidal effect of tick lysozyme and the process of dying off of bacteria injected in hemolymph reflect, to some extent, the correlations between macroorganisms and microorganisms. It shows that the presence of bacteria is associated with mobilization of lysozyme, the amount of which grows and persists for a rather long time, even after the infective agent has perished.

In the next series of experiments, we studied the role of hemolymph cellular elements in the protective mechanism of vector of infections. Like Dolp (1970), Kryuchechnikov et al. (1979) and Cooper (1980), we demonstrated different types of cells in noninfected specimens: prohemocytes, plasmocytes, early and mature, spherular cells, the quantities of which in healthy ticks served as the control. We interpreted deviations thereof after infecting ticks as their defense reactions to bacteria. In the course of the study we learned that the change in quantity of hemolymph cells fluctuated over a wide range with each type of pathogen.

In ticks infected with M. lysodeikticus, St. aureus and S. typhimurium, the quantity of cells of different types in hemolymph began to increase in the 6th h

after injection of bacteria; it persisted at above the ordinary level for 72 h then gradually declined (Figure 3). In addition to increase in number of hemolymph cells in ticks infected with bacteria, we also found cells with microorganisms subjected to phagocytosis. According to our data, the morphological signs indicate that plasmocytes are the phagocytes. In additional studies we determined that the phenomenon of phagocytosis by plasmocytes becomes evident 2 h after injection of pathogen into tick hemolymph, and it lasts for the first 5 days. We believe that the mechanisms of phagocytosis of Salmonella LT-2 could be interpreted as absorption of bacteria by plasmocyte cytoplasm, which is associated with swelling and change in their form, with further disorganization of the pathogen. In the course of phagocytosis, we observed changes in the phagocytic cell as well, which were manifested by decrease in coloration of cytoplasm, change in dimensions and shape of vacuoles and nuclei.

Thus, our findings indicate that some hemolymph cells of ticks participate in bacterial phagocytosis. The results of the morphological study warrant classification of mature plasmocytes with macrophage cells. We established a correlation between lysozyme titer and increase in number of tick hemolymph cells after infection with different species of bacteria.

These data indicate that ticks have nonspecific humoral and cellular reactions. We failed to demonstrate specific antibodies in hemolymph in response to "immunization" of ticks with phage FX-174. Evidently, lysozyme together with phagocytic activity of plasmocytes has a bactericidal effect on various microorganisms.

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CSO: 1840/378

UDC: 576.895.42:578.085.2

CULTIVATION OF ORGANS OF ORNITHODOROS PAPILLIPES (ARGASIDAE) TICKS

Leningrad PARAZITOLOGIYA in Russian Vol 16, No 3, May-Jun 82 pp 253-255

[Article by V. N. Kryuchechnikov and S. V. Shcherbakov, Institute of Epidemiology and Microbiology imeni N. F. Gamaleya, USSR Academy of Medical Sciences, Moscow]

[Text] A method is proposed for producing cultures of argasid ticks in an extremely simple microchamber, which permits long-term vital observation of the culture with minimal outlay of culture medium in the absence of antibiotics.

Development of methods for long-term conservation of live organs of ticks in vitro constitutes an independent task for experimental physiology of Ixodes ticks. Increased interest in stabilized organ and cell cultures is also observed in the work dealing with cultivation of organs and tissues of other groups of arthropods, mainly insects (Marks, 1980). The success of producing transferable cultures of Ixodes tick cells--Hyalomma asiaticum (Medvedeva et al., 1972), Boophilus microplus (Pudney et al., 1973; Holman and Ronald, 1980; Ronald and Cruz, 1981), Rhipicephalus appendiculatus (Varma et al., 1975), Dermacentor parumapertus (Bhat and Yunker, 1977), Dermacentor andersoni (Yunker and Meibos, 1979)--has been related up to this time exclusively to undifferentiated embryonic cells obtained from tick eggs. These cultures make it now possible to study development of a number of pathogens--arboviruses, gallprovia [?], Babesia and others; however, the possibility of extrapolating the results of these studies to events occurring in ticks is obviously limited. As for the rather numerous successful attempts made to date to obtain primary cultures of Ixodes tick cells from different sources (central intestine, gonads, salivary glands, etc.), proliferation of these cells in culture usually leads to loss of morphological and functional resemblance to normal tick cells. For this reason, it is extremely interesting to obtain rather simple, stabilized and surviving cultures of organs and cells of ixodid ticks that would be accessible to biochemical, morphophysiological and microbiological investigations, from the standpoint of studying the normal physiology of this group of arthropods, including such extremely important functions as oogenesis, digestion, osmoregulation, functional changes in membrane structures of organs, their humoral regulation, etc. Without in-depth comprehension of these processes it is impossible, in particular, to pursue further studies of mechanisms of the links between pathogens of transmissible infections and ticks, since it is expressly through the

salivary glands and gonads that infection is received and transmitted. Organ cultures offer new opportunities for assessment of differences in nature of relations between these organs and pathogens of transmissible diseases in specific and nonspecific vectors.

We offer here a method of obtaining long-lived cultures of Ornithodoros papillipes (Bir.) argasid tick organs, which assures a stable state of the organ without proliferation of cells it contains.

Modifications of Eagle's medium (Hoffman et al., 1970), medium 199 (Kaufman, Phillips, 1973; Kaufman, 1976) or combinations thereof (Sidorov et al., 1979) with addition of various sera, vitamins and antibiotics are often used as media to obtain surviving cultures of tick organs and cells. After testing several nutrient media (including those used the most to cultivate arthropod cells--Grace medium and the medium of Mitsuhashi and Maramorosch with addition of different concentrations of bovine fetal serum), we found that the best results for our object is attained with the medium previously proposed for primary cultures of argasid tick hemocytes (Sidorov et al., 1979); this is a mixture of basic Eagle medium with vitamin broth according to Mitchell and Wilson, but without fetal bovine serum.

A tick organ, for example salivary gland, separated under sterile conditions, was placed in a very elementary chamber, namely the space formed by an orifice, 6 mm in diameter, cut through a standard slide, which is sealed on both sides with cover glasses fixed with paraffin. The surface of the slide and cover glasses forming such a chamber was first sterilized by flame or ultraviolet light from a type BUV or PRK lamp. Then, melted paraffin is used to attach the cover glass to the bottom of the slide with the hole, and the isolated organ is placed in the formed well; the well is filled with medium (0.03-0.04 mℓ), sealed on the top with another cover glass so that no air bubbles can penetrate, and also secured with paraffin. The obtained preparations, for example, salivary glands of O. papillipes, were incubated in such chambers at 28°, and they were examined daily using a phase contrast microscopic attachment (see Figure [not reproduced]). The alveolar cells of salivary glands retained their original state under these conditions; they did not proliferate and did not undergo a change in appearance. Plasmolysis, tears and separation of membrane structures, deformation or other degenerative changes did not occur up to the 23d day (term of observation). In spite of the total absence of antibiotics in the medium, there was not a single instance of bacterial growth. The proposed method has the following advantages: 1) it makes it possible to pursue long-term observation of living, separated tick organs, which are in a stable state, in a medium without antibiotics, which is particularly important when working with pathogens; 2) use of any special cultivation dishes or complicated chambers is not required, and one can work with readily available slides and cover glasses; 3) observation can be made from any side of the chamber using both an ordinary and inverted microscope, and whatever the thickness of the preparation one can work normally with any high-aperture systems without unsealing the chamber; 4) outlay of culutre medium is drastically reduced because of the extremely small size of the chamber.

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CSO: 1840/378

VISCERAL LEISHMANIASIS

Ashkhabad ZDRAVOOKHRANENIYE TURKMENISTANA in Russian No 1, Jan 82 pp 41-44

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[Abstract] Description is provided of seven pediatric patients (9 months to 11 years old) with visceral leishmaniasis in Turkmenistan. The clinical picture included the typical findings of fever, progressive anemia, wasting, splenomegaly, hepatomegaly, edema, etc. Treatment included sodium stibogluconate, blood and red cell transfusions, vitamins, antibiotics, and supportive therapy. Two of the children presented in moribund condition did not survive. Two case reports are included. References 7 (Russian).
[374-12172]

UDC 616.981.42-036.11/12

EFFECTS OF CONCURRENT DISEASES ON BRUCELLOSIS

Alma-Ata ZDRAVOOKHRANENIYE KAZAKHSTANA in Russian No 5, May 82 pp 27-29

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[Abstract] An analysis was made of 201 case histories to determine the effects of a concurrent illness on the clinical course of brucellosis. The results demonstrated that patients with an accompanying disease (otolaryngological infections, gastrointestinal diseases, atherosclerosis, nephritis, rheumatism, etc.) presented with more severe symptoms, complications, a longer hospital stay, and, generally, brucellosis was diagnosed later. References 3 (Russian).
[382-12172]

UDC 616.981.42-036.12-008.92-053.8/9-073.97

AGE FACTORS IN ELECTROLYTE METABOLISM AND EKG INDICATORS IN CHRONIC BRUCELLOSIS

Alma-Ata ZDRAVOOKHRANENIYE KAZAKHSTANA in Russian No 5, May 82 pp 32-34

ARYMBETOV, M. S., DZHANGALIYEV, T. T., ZHUMANBAYEV, K. A. and KUZ'MIN, A. I., Chair of Infectious Diseases, Karaganda Medical Institute; City Hospital for Infectious Diseases, Karaganda

[Abstract] Investigations were conducted in 101 patients with chronic brucellosis to determine age-related factors in attendant EKG changes and alterations in electrolyte metabolism. The male and female patients were divided into three age groups (20-44 years, 45-59 years, and 60-74 years). Evaluation of various Na and K gradients showed that the K gradient was depressed in patients with chronic brucellosis, with the more pronounced depression occurring in the older age groups. A significant depression of the Na gradient was evident only in the youngest patients. Evaluation of the EKG recordings revealed age-related prolongation of the P-Q interval (up to 0.6 sec), depression of the S-T segment below the isoline, diminution or negative T wave, and a spread of the QRST complex. The EKG abnormalities, which were more pronounced in the more advanced age groups, were indicative of diffuse dystrophic changes in the myocardium and were ascribed to changes in the electrolyte balance. References 5 (Russian).
[382-12172]

UDC 547.963.3

TRANSLOCATION MECHANISM FOR PEPTIDYL-tRNA AND mRNA IN RIBOSOME

Kiev DOKLADY AKADEMII NAUK UKRAINSKOY SSR, SERIYA B: GEOLOGICHESKIYE, KHIMICHESKIYE I BIOLOGICHESKIYE NAUKI in Russian No 6, Jun 82 (manuscript received 19 Mar 82) pp 73-75

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[Abstract] A new model is proposed for the mechanism of translocation that overcomes difficulties in models suggested earlier. A direct interaction is suggested between certain ribosomal proteins and the codon-anticodon complex, leading to selective stabilization of correct codon-anticodon associations at the stage of aminoacyl-tRNA selection. For this it is necessary to assume only that an X.(codon-anticodon) complex formed at the A center (where X is the corresponding section of the ribosome) is then capable of being transformed into a P center, thus insuring stability of the codon-anticodon contact in translocation. In more detail, this would mean that assembly of the X.(codon-anticodon) complex takes place at the ribosomal A center while dissociation occurs at the P center. Translocation would be insured by the conformation change of the ribosome, as a result of which the (codon-anticodon)-binding part X is transformed from an A center to a P center. Stability of codon-anticodon contact would be determined not so much and not only by energy in the codon-anticodon interaction as by bonding energy of the double-strand codon-anticodon complex with the proteins in the X section of the ribosome. The proposed mechanism covers both the accuracy and rate of elongation and does not contradict available experimental findings. It explains translocation in a new way, postulating the active participation of the ribosome in this functional act; and it makes it possible to suggest that protein factors act with GTP in elongation. Methods for experimental verification of the proposed mechanism have been examined elsewhere by the author. References 12: 5 Russian, 7 Western. [384-9642]

UDC 616.36-002-022.6-078.73

NOVEL SEROLOGIC METHOD FOR DETECTION OF HEPATITIS B SURFACE ANTIGEN IN PATIENTS WITH VIRAL HEPATITIS IN MOLDAVIAN SSR

Kishinev ZDRAVOOKHRANENIYE in Russian No 2, Mar-Apr 82 (manuscript received 13 Oct 81) pp 30-32

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[Abstract] Comparative serologic studies were conducted on the detection of hepatitis B surface antigen by radioimmunoassay (RIA) and immunoelectrophoresis (IEP). The results were positive in one of 58 healthy subjects and 8 of 162 patients with viral hapatitis by the IEP method, while RIA yielded corresponding positive results of 9 and 104, respectively. Furthermore, RIA was positive in 48.7% of patients with viral hepatitis that had not undergone any parenteral procedures for 2-6 months prior to the disease, in 71.6% of subjects with isolated parenteral procedures (blood transfusion, injections, finger pricks for blood typing, etc), and in 58.3% of patients with multiple parenteral procedures. These findings underline the contention thet "serum hepatitis" and "hepatitis B" are not necessarily identical entities, and that the former includes other etiologic forms of hepatitis. References 6: 1 Rumanian, 1 Western, 4 Russian.
[351-12172]

UDC 616.981.51-097.3

IN VIVO EFFECTS OF LEVAMISOLE ON INTERACTION OF MONONUCLEAR PHAGOCYTIC SYSTEM WITH ANTHRAX STRAIN STI-1 VACCINE

Kishinev ZDRAVOOKHRANENIYE in Russian No 2, Mar-Apr 82 (manuscript received 18 May 81) pp 34-38

KIKU, V. F., SHLYAKHOV, E. N., ZAYTSEVA, L. G., and FAVORSKAYA, Yu. N., Chair of Epidemiology and Immunobiology, Kishinev Medical Institute

[Abstract] BALB and C57 black mice were used in studies on the effects of levamisole (e.5 mg/kg, i.p.) on the processing of anthrax strain Sti-1 vaccine by peritoneal and splenic mononuclear phagocytes. Observations conducted for a 28-day period showed that levamosole retarded the uptake of the vaccine by the peritoneal macraphages, but also promoted the

retention of phagocytized bacilli; however, uptake by the splenic macrophages was enhanced by levamisole, in comparison with untreated mice. Hepatic lymphocytes contained significantly more of the labeled (C-14) vaccine that did the splenic lymphocytes; the effects of levamisole was to slow the disappearance of the label from both sets of lymphocytes. Although levamisole had no effect on lysosomal apparatus of the splenic cells, it enhanced the activity of cathepsin in the lysosomal fraction of the peritoneal macrophages and decreased lysosomal membrane permeability in the Sti-1 treated mice. Treatment with levamisole alone depressed lysosomal cathepsin activity of the peritoneal macrophages almost two-fold. Figures 4; references 5 (Western).
[351-12172]

UDC 616.12-008.46:001.8(470)

CURRENT AND FUTURE SCIENTIFIC RESEARCH ON CARDIAC INSUFFICIENCY IN RSFSR

Moscow SOVETSKAYA MEDITSINA in Russian No 5, May 82 pp 3-9

[Article by Professor A. P. Golikov and Candidate of Medical Sciences S. A. Koroleva, Scientific Research Institute of Emergency Care imeni N. V. Sklifosovskiy, Moscow]

[Text] The problem of controlling cardiac insufficiency is of increasing importance. The aging of the population, characteristic of all developed nations, successes in the control of rheumatism, permitting a prolongation of the life and work capacity of heart-disease patients, the decline in the frequency of sudden death in acute myocardial infarction (M. Ya. Ruda) and successes in the study of noncoronarogenic myocardial diseases have advanced to the forefront the problem of preventing and curing cardiac insufficiency in these patients (V. S. Gasilin et al.; F. I. Komarov).

The years of the 10th Five-Year Plan were marked in our country by important nation-side events which appreciably influenced the development of health care and medical science, in particular the development of the cardiological service in the RSFSR.

The new constitution of the USSR (1977) confirmed the right of each soviet citizen to competent medical care and defined as a basic direction the steady expansion of preventive measures in the control of various diseases.

The realization of these positions has been assured by the implementation of the resolutions of the 25th and 26th CPSU Congresses and the decrees of the CPSU Central Committee and USSR Council of Ministers on "Measures for the Improvement of National Health Care" (1977) and of the RSFSR Supreme Soviet on "Course of Implementation of the Law of the RSFSR on Health Care and Measures for the Further Improvement of the Health Care of the Population" (1980).

Solution of the problem of controlling cardiac insufficiency was given special attention at the Second Congress of RSFSR Cardiologists (1978) and at the Third All-Union Congress of Cardiologists (1979). The resolutions of the congresses defined the basic directions of scientific research on cardiovascular diseases and made it possible to develop the scientific bases

for structuring a single specialized cardiological service in the nation (Ye. I. Chazov).

The possibilities of controlling cardiac insufficiency have increased considerably in connection with recent scientific achievements in the study of the pathogenesis of cardiac insufficiency, in the improvement of methods for evaluating cardio- and hemodynamics, in the development of new pathogenetic methods for intervening in the various mechanisms of circulatory disorder and in the creation and introduction into practical health care of new effective medicinal preparations. Study has been made of the role of disturbances in myocardial cellular metabolism, calcium transport and of myocardial ultrastructural disturbances in the genesis of decline in myocardial contractile capacity. Concepts have been introduced on myocardial pre- and afterloads; their role, along with decline in myocardial contractile capacity, in disruption of the pump function of the heart has been clarified (F. I. Komarov and N. M. Mukharlyamov).

More accurate definition of the mechanisms of disruption of the pump function of the heart has made it possible to characterize objectively the initial forms of cardiac insufficiency and to use--along with the traditional methods for treating circularory deficiencies (cardiac glycosides, saluretics)--preparations that selectively improve myocardial metabolism, in particular nucleoside derivatives, and preparations that influence tonus of the peripheral veins regulating venous flow to the heart, myocardial afterload and calcium metabolism in the myocardial cell.

Heart surgery has made an important contribution to the study of cardiac insufficiency in recent years. The genesis of cardiac insufficiency during heart diseases has been studied before, during and after heart operations, the role of respiratory disturbance and artificial ventilation has been studied in the development of acute circulatory deficiency, new surgical approaches have been developed for the correction of congenital and acquired heart diseases, the surgical treatment of acute and chronic forms of ischemic heart disease (coronary shunting, resection of acute and chronic cardiac aneurism) and the use of intra-aortic balloon contrapulsation in the treatment of acute cardiac insufficiency.

The use of computer technology and mathematical modeling show promise for the study of cardiac insufficiency, permitting development of new approaches in the diagnosis of circulatory disorders and therapy selection on the basis of a circulatory-system model created to reflect the basic laws of circulation, experimentally-determined characteristics and the individual features of circulatory disturbance in each specific situation (V. I. Burakovskiy).

Combatting cardiac insufficiency has many aspects and must be solved by the joint efforts of many research groups. The effectiveness of the scientific research depends upon its correct planning, providing for precise definition of specific and potential tasks; it depends upon provision of scientific personnel and creation of a modern material-technical base for administering institutions. A unified planning system and precise coordination of the introduction of scientific-research achievements into practical health care are basic conditions for the successful solution of these problems (S. Ya. Chikin et al.).

In the RSFSR these problems were assigned in 1977 to a Commission--subordinate to the Scientific Medical Council of the RSFSR Ministry of Health--on the problem "Circulatory Insufficiency. Disturbances in Cardiac Rhythm" (Professor A. P. Golikov, chairman), which is included in the Scientific Council on Cardiovascular Diseases (Professor V. A. Lyusov, chairman) and maintains close contacts with the All-Union Commission "Circulatory Deficiency. Disturbances in Cardiac Rhythm" (Professor N. M. Mukharlyamov, chairman).

During the period following this, the commission has systematized information on the state of scientific research on the problem of cardiac insufficiency conducted in the republic and has evaluated its direction, importance, volume and technical level. The commission regularly discusses plans for scientific research, institutional reports on work done and plans for introducing research results into practical health care; it analyzes topics and monitors the progress of doctoral and candidate dissertations. Conclusions and proposals are transmitted to the RSFSR Ministry of Health and to administrating institutions (B. D. Komarov et al.).

During the 10th Five-Year Plan research on the problem of cardiac insufficiency was conducted at 15 medical and 3 scientific-research institutes in the republic. The basic directions in the research were study of the pathogenesis of cardiac insufficiency, the development and introduction of new, primarily noninvasive methods, for diagnosing cardiac deficiency, the perfection of methods for complex therapy of cardiac insufficiency under hospital, ambulatory-polyclinic and emergency care conditions and the improvement of existing and development of new methods for differential diagnosis and surgical treatment of heart diseases complicated by cardiac insufficiency.

The contribution of institutions to the solution of cardiac insufficiency has been uneven. In addition to institutions that conduct in-depth research (Second Moscow State Order of Lenin Medical Institute (II MOLGMI), Orenburg Medical Institute, Novosibirsk Scientific Research Institute of Circulatory Pathology, Moscow Scientific Research Institute of Emergency Care imeni N. V. Sklifosovskiy), some medical institutes conduct sporadic scientific research for which they do not have an adequate material and technical base.

Research at the Orenburg Medical Institute is conducted in two directions: the study of biochemical shifts and immunity in patients with various forms and stages of chronic cardiac insufficiency and the study of general and regional hemodynamics with the aid of detecting early, preclinical stages of cardiac insufficiency.

It was shown that disturbances in water-electrolyte metabolism in patients with congestive cardiac insufficiency are accompanied by considerable disturbances in nitrogen and carbon metabolism: ammonia, creatinine and glucose levels in the blood increase, especially during refractory circulatory deficiency. Carbohydrate and protein metabolism were normalized upon involvement in a system of glutamic acid and insulin therapy, accompanied by a decline in congestion. These data were explained by the results of research

conducted at the II MOLGMI and Izhevsk Medical Institute, which demonstrated inhibition of insulin secretion and metabolism conditioned by hyperactivity of the sympatheticoadrenal system and by disturbances in the secretion of corticosteroids and pituitary hormones. Disturbance of the mechanism of utilization of glucose whose entry into the myocardial cells depends upon the adequate action of insulin, conditions a decline in myocardial functional activity and determines the important role of glucose in the treatment of cardiac insufficiency (correction of carbohydrate metabolism).

The development of cardiac insufficiency, independently of the nature of the underlying illness, is accompanied by an inhibition of both the humoral and cellular components of immunity (Orenburg Medical Institute). Concomitant changes in the blood level of β-lipids and in the spontaneous rosette formation test can be used as criteria for the early diagnosis of cardiac insufficiency. The inclusion in therapy of preparations that selectively influence nonspecific immunity (methyluracil) has been recommended.

An interrelation has been established between water-electrolyte metabolism (II MOLGMI), intradermal state and the rheological properties of the blood; the important role of hemorheological disturbances has been established in the genesis of microcirculatory disorders and thromboembolic complications in patients with circulatory deficiency. The character of microcirculatory disorders during cardiac insufficiency has been studied comprehensively, and the development of disseminated intravascular coagulation (DIC) has been established as an important component in the pathogenesis of circulatory deficiency. Diagnostic tests have been developed for demonstrating DIC during cardiac insufficiency; the diagnostic significance of individual hemostatic indicators for evaluating the influence of cardiac glycosides and saluretics on the course of DIC and blood rheological properties and the necessity of including antithrombic preparations in the system of therapeutic measures during congestive cardiac insufficiency have been determined.

At the Novosibirsk Scientific Research Institute of Circulatory Pathology, metabolic disturbances in patients with heart diseases complicated by cardiac insufficiency have been studied in relation to disease type, the degree of expression of the cardiac insufficiency, the character and volume of surgical therapy, the type of anesthesiological provision and the course of the postsurgical period.

Studies have been made on glycolysis and the pentose phosphate cycle in erythrocytes, the dynamics of corticosteroids in the blood, nonspecific immunity with respect to blood-serum lysozyme and complement activities, the state of erythrocyte active-ion transport, with ATPase, assay, the level of lactic and pyruvic acids, and the activaties of LDH, with isozymes, the glucose-6-phosphate dehydrogenase and transketolase in the plasma and erythrocytes.

A high ATPase activity, an elavated erythrocyte potassium-ion content, a distinct relationship between the degree of decline in the plasma potassium/sodium ratio and the severity of hypoxemia and an elevation in the activity of glycolytic enzymes with a considerable rise in the blood pyruvic and lactic acid contents have been demonstrated in congenital cyanotic heart diseases. The results of the investigations have permitted the authors to estimate objectively the severity of the course of heart disease complicated by circulatory deficiency, to judge the degree of its expression and to estimate the influence of a number of factors of the surgical period upon adaptive mechanisms; the results have provided a basis for characterizing the effectiveness of anesthesiological protection and the success of disease treatment, to eliminate, rapidly, metabolic disorders during the surgical process, to judge the prognosis of the illness.

An important recent success has been the study of the function of external respiration during chronic (Leningrad Pediatric Medical Institute) and acute (Moscow Scientific Research Institute of Emergency Care imeni N. V. Sklifosovskiy) cardiac insufficiency. It has been shown that, at all stages of circulatory deficiency, hemodynamic disturbances in the pulmonary circulation are accompanied by the development of a respiratory insufficiency of mixed genesis (primarily of the restructive--sic--type), which at the early stages precedes the hemodynamic shifts. The authors found that, at a high overall pulmonary resistance and moderate hemodynamic pressure in the syntemic circulation, the heart performs work under unfavorable conditions of isometric hyperfunction, which accelerates the development of cardiac insufficiency.

A system of quick tests has been developed at the Moscow Scientific Research Institute of Emergency Care imeni N. V. Sklifosovskiy for studying the function of external respiration under emergency conditions, primarily during acute myocardial infarction complicated by cardiac insufficiency (A. P. Golikov et al.). It has been shown that early disturbances in respiratory function are first manifested by an increase in the alveolar-arterial oxygen gradient, by hyperventilation and by an increase in oxygen consumption. As the hemodynamic disorders increase an uneveness appears in the ventilation-perfusion relationships, the arterial-alveolar carbon dioxide gradient increases and there is a progressive metabolic, followed by a mixed, acidosis. Tests showed that these changes are associated with neurohumoral disturbances characterizing stress and lead to the conclusion that the disturbance in pulmonary circulation, naturally developing during the acute period of myocardial infarction and manifested by respiratory disturbance, involves not only the myocardial injury but also the acute stress, which sharply intensifies the changes in hemodynamics, oxygen supply and metabolism. This determines the appropriate choice of therapy directed at the treatment of respiratory and circulatory disturbances and the removal of stress.

The wide use of noninvasive methods of investigating central and peripheral hemodynamics has made it possible to develop diagnostic systems for elucidating the initial forms of cardiac insufficiency under conditions of the hospital (Izhevsk Medical Institute and II MOLGMI) and ambulatory-polyclinical institutions (Leningrad Pediatric Medical Institute, Kuban and Orenburg Medical Institutes and the Moscow Scientific Research Institute of Emergency Care imeni N. V. Sklifosovskiy). Dynamic monitoring of hemodynamics has made it possible to develop a system of extended, uninterrupted therapy of cardiac insufficiency using cardiac glycosides, diuretic preparations, -blockers, peripheral vasodilators and preparations regulating metabolism.

The noninvasive methods of investigating the cardiovascular system in emergency situations used at the Moscow Scientific Research Institute of Emergency Care imeni N. V. Sklifosovskiy, under hospital and emergency medical care conditions, have made it possible to clarify the characteristics of the genesis of acute cardiac insufficiency in patients with acute myocardial infarction, during hypertensive crisis and other illnesses (A. P. Golikov and N. I. Mayorov). A relationship was demonstrated between indicators of central hemodynamics and the expression of stress characterized by activation of neurohumoral systems, primarily by activation of the sympatheticoadrenal and kallikrein-kinin systems and adrenal-cortical function. The timely elimination of the excessive influence of stress factors on the heart by neuroleptanalgesia and blockers of adrenergic structures may prevent or diminish the development of cardiac insufficiency during acute myocardial infarction.

Various types of hemodynamic disturbance have been demonstrated during pulmonary edema depending upon the primary illness under which the given syndrome develops. It has been shown that the main factor in the development of pulmonary edema is a relative left-ventricular deficiency as compared with the right, and, also, that during hypertensive crisis complicated by pulmonary edema there is frequently no absolute cardiac insufficiency and the external capacity of the left ventricle is higher than in healthy people at rest. These data provided the basis for a differential approach to the treatment of pulmonary edema taking into account preload, myocardial contractility and afterload.

Of interest among the investigations of regional blood flow are the results of study of cerebral circulation during cardiac insufficiency, the quantitative estimation of cerebral hemodynamics and the influence upon hemodynamics of various medicinal preparations used to treat cardiac insufficiency (Orenburg and Irkutsk medical institutes).

A decline in the indicators of cerebral hemodynamics has been demonstrated with progressive cardiac insufficiency, a decline which is accompanied by disturbance in bioenergetic processes in the brain: glutamic and aspartic acid concentrations decline with simultaneous increase in the metabolites of carbohydrate metabolism and in transaminase activity.

Study of the morphological and functional conditions of the stomach and small intestine during chronic cardiac deficiency and hypoxia (Tomsk Medical Institute) demonstrated a depression in acid and pepsin production, a decline in gastric bioelectrical activity and blood supply, an elevation in the loss of endogenous protein in the gastrointestinal tract lumen and a decline in intestinal parietal digestion and bioelectrical activity. Comparison of the functional and morphological state of the stomach and small intestine with basic indicators of cardio- and hemodynamics, with the gas composition of the blood, acid-base state and certain indicators of metabolism demonstrated a pathogenetic relation. Functional disturbances at the early stages of development of cardiac insufficiency progress and become irreversible at the advanced forms of cardiac deficiency.

The plan for scientific research for 1976-1980 in RSFSR institutions on the problem of cardiac deficiency was fulfilled and, as shown by an analysis of this research, an important contribution was made to the study of the pathogenesis of chronic circulatory deficiency and to the development of new, and improvement of existing, methods of diagnosis and treatment.

The efforts of the Main Administration of Scientific Research Institutes and the coordination of the scientific research of the RSFSR Ministry of Health, the Scientific Council on Cardiovascular Diseases and the Problem Commission "Circulatory Deficiency. Disturbances in Cardiac Rhythm", under the Scientific Medical Council of the RSFSR Ministry of Health, have achieved positive changes in the conduct of scientific research on the problem of extended therapy: the urgency and importance of research topics have been increased, the level of the methodological approach to research problems has been enhanced and long-term comprehensive research programs have been developed involving research groups of various backgrounds at institutions, in-house, and cooperation with other institutions.

The leading institutions which h ad research on large segments of the problem have been identified: the Orenburg Medical Institute on the problem of chronic cardiac insuffiency and the Moscow Scientific Research Institute of Emergency Care imeni N. V. Sklifosovskiy on the problem of acute cardiac insufficiency.

Thirty seven scientific investigations have been planned at 12 medical and 3 scientific research institutes in the republic for 1981-1985 on the problem of cardiac insufficiency. The overwhelming majority of these investigations have been devoted to study of chronic cardiac insufficiency. For the first time in the republic a long-term investigation has been planned for study of the genesis, diagnosis and treatment of acute cardiac insufficiency (Moscow Scientific Research Institute of Emergency Care imeni N. V. Sklifosovskiy).

The II MOLGMI will continue long-term investigations (1976-1985), combining the efforts of clinicians and experimentalists (scientific leaders are professors G. I. Kositskiy and A. V. Vinogradov) to study the genesis of cardiac insufficiency and to develop a drug therapy.

Theoretical investigations at the Orenburg Medical Institute have been aimed at elucidating adaptational responses to disturbances leading to myocardial insufficiency. This institute was the first in the republic to begin epidemiologic investigations of cardiac insufficiency and to study the incidence of cardiac insufficiency in the nonorganized population; factors have been studied that promote the appearance of insufficiency, and a system of measures for the early diagnosis and prevention of cardiac insufficiency (primary and secondary prevention) has been developed, with the introduction into practical health care of institute-developed schemes for extended, uninterrupted treatment of the early stages of cardiac insufficiency and an evaluation of their economic effect.

Research will be continued on regional, in particular cerebral, circulation with an evaluation of the action of cardiac glycosides; this involves a study of their influence on brain structures that participate in the regulation of cardiovascular activity and of the role of these influences on the heart during cardiac insufficiency.

A study of cerebral vascular autoregulatory mechanisms directed at maintaining a constant cerebral blood flow during acute myocardial ischemia is planned by the Irkutsk Medical Institute.

The Bashkir Medical Institute plans a comprehensive clinical and experimental investigation to develop an important treatment of cardiac deficiency during a number of illnesses that takes into account the state of the sympathetico-adrenal and kallikrein-kinin systems, the system of hemostasis, the state of the microcirculation and their interrelations and changes during therapy.

The Novosibirsk Scientific Research Institute of Circulatory Pathology plans research (1981-1985) on the clinical pharmacology of cardiac glycosides during heart diseases, studying, in addition to the pharmacology of digoxin and strophanthin, questions of the metabolic effect of these preparations.

The Kazan Medical Institute will pursue questions of the metabolic therapy of cardiac insufficiency using Soviet preparations of the organophosphoros groups and stimulators of metabolic processes with an evaluation of myocardial contractile capacity, the state of central hemodynamics, metabolic processes and hormone activity.

An experimental and clinical study of the possibility of employing instrumental methods of therapy during acute cardiac insufficiency is planned at the Voronezh and Kuybyshev Medical Institutes in patients with heart diseases and acute myocardial infarction.

Further improvements in the methods for monitoring the state of circulation and respiratory function, for the early detection of signs of cardiac insufficiency and for the protection of the myocardium under artificial circulation during heart operations have been planned (Moscow Oblast Clinical Scientific Research Institute (MONIKI) imeni N. F. Vladimirskiy, Novosibirsk Scientific Research Institute of Circulatory Pathology and the Irkutsk and Gor'kiy Medical Institutes).

The Kuybyshev Medical Institute will continue research on the mechanism of the autoregulation of systole and diastole during compensation and decompensation in patients with acute myocardial infarction and heart diseases.

Thus, in addition to the traditional directions in the study of cardiac insufficiency (etiogenesis of circulatory deficiency, improvement of methods for early diagnosis and comprehensive medical therapy, instrumental and surgical treatment of patients with myocardial infarction and heart diseases complicated by cardiac insufficiency), new promising directions have appeared in the study of cardiac insufficiency. This primarily refers to the stimulation of research on the study of pathogenesis, the improvement of methods for the diagnosis and control af acute cardiac insufficiency during various illnesses, the development of epidemiologic investigations with the aim of explaining the incidence and detecting the early forms of cardiac insufficiency, the development of measures for primary and secondary prevention of cardiac insufficiency, the resolution of organizational questions in the preventive medical examination of patients with cardiac insufficiency and the objective evaluation of the effectiveness of therapeutic and preventive measures, of their economic effect.

The use of computer technology and the methods of mathematical analysis are of promise for developing new methods of evaluating the genesis of cardiac insufficiency, diagnosing its initial forms, selecting appropriate therapy, prognosis and developing a classification of the various forms of cardiac insufficiency on the basis of maximally objectified criteria of the degree of its expression.

The main principles for further improvement of scientific research on cardiac insufficiency are the following:

1) Increase the role and opportunity for active influence of problem commissions in scientific research planning;

2) identify the leading institutions heading and directing the research on large segments of the problem with the development of unified problems of goal-oriented research;

3) strengthen the links between scientific research institutions and practical health care institutions for wide and rapid introduction of scientific achievements into practice;

4) strengthen the material-technical base of scientific research institutions.

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ECONOMIC ASPECTS OF ILLNESS-RELATED TEMPORARY LOSS OF WORKING CAPACITY AMONG OIL WORKERS IN WESTERN SIBERIA

Moscow SOVETSKOYE ZDRAVOOKHRANENIYE in Russian No 2, Feb 82
(manuscript received 12 May 81) pp 14-17

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[Abstract] An economic analysis was made of the factors contributing to loss of working days because of illness by oil workers in the oil fields of the Nizhnevartovsk Rayon, Tyumen' Oblast, Western Siberia during the period 1972-1976. As a result of implementation of preventive measures in the area of industrial hygiene, and improvements in the working and living conditions, during the following four year period (1976-1979) losses due to illness-related work loss were reduced by 35,485,000 rubles. References 6 (Russian).
[322-12172]

UDC 362.1-057:622[(47+57]-17)

ORGANIZATION OF THERAPEUTIC-PROPHYLACTIC SERVICES FOR MINE WORKERS IN FAR NORTH AND BEYOND THE POLAR CIRCLE

Moscow SOVETSKOYE ZDRAVOOKHRANENIYE in Russian No 2, Feb 82
(manuscript received 1 Sep 81) pp 24-28

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[Abstract] Factors affecting miners and other workers in mining industries were evaluated from the point of view of preventing loss of worktime due to illness or its sequelae in Yakutia. The results demonstrated that the creation of rehabilitation services and departments at the various

industry-related clinics and hospitals significantly improved the effects of medical therapautics in the case of workers affected with pulmonary, hypertensive, and ulcerative problems, as well as other common illnesses, and reduced the amount of time away from work for medical reasons. The recommendation is made that rehabilitiation services be established at all industrial health clinics in the Far North and Transpolar regions. References 4 (Russian).
[322-12172]

UDC 575.591

MIGRATION AS FACTOR IN GENETIC HETEROGENEITY OF LARGE URBAN POPULATIONS

Moscow GENETIKA in Russian Vol 18, No 5, May 82 (manuscript received 19 Feb 81) pp 833-838

KALABUSHKIN, R. A., PROKHOROVSKAYA, V. D., KHIL'CHEVSKAYA, R. I. and ALTUKHOV, Yu. P., Institute of General Genetics, USSR Academy of Sciences, Moscow

[Abstract] Studies were conducted on the genetics and frequencies of the ABO blood group in the Moscow population in the period 1976-1979. Evaluation of current data and retrospective findings dating back 50 years show that while there were no significant phenotypic differences among the different nationalities, within the Russian group significant differences were observed, and that the changing profile for Moscow reflects the role of immigrants from different regions of Russia. References 13: 2 Western, 11 Russian.
[367-12172]

UDC 575.91

INCIDENCE OF CLEFT LIP AND PALATE IN MOSCOW

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[Abstract] Seven maternity hospitals in Moscow were surveyed in the period 1970-1976 to establish the incidence of cleft lip and palate. Examination of 142,911 neonates (including stillborns) revealed 190 infants with such anomalies. After exclusion of 14 cases with established etiology, the incidence for cleft lip (palate) (CL(P)) was 0.75 per 1000, and for cleft palate (CP) 0.48 per 1000, yielding an overall incidence of 1.23 per 1000

neonates. The sex ratio for CL(P) was 1.33, (B>G), and for CP 0.64 (G>B). There was no correlation between the incidence of the anomalies and season of birth or maternal age. However, the incidence of both CL(P) and CP was found to increase with the birth order. Since this contradicts published literature on the subject, further evaluations will have to be conducted. References 6: 2 Russian, 4 Western.
[367-12172]

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TRAINING OF PERSONNEL FOR LABORATORY WORK WITH ESPECIALLY DANGEROUS VIRUSES

Minsk ZDRAVOOKHRANENIYE BELORUSSII in Russian No 3, Mar 82
(manuscript received 17 Jun 81) pp 39-41

[Article by V. S. Bortkevich and Yu. T. Sharabchiyev, Belorussian Scientific Research Institute of Epidemiology and Microbiology]

[Text] Of particular importance in work with especially dangerous infections is the selection and training of personnel. Without this, quality and rapid research with especially dangerous viruses is impossible even when maximum safety measures are provided.

A well-designed system presently exists at the nation's antiplague institutions for preparing personnel and enhancing their qualifications for work with especially dangerous bacterial preparations. This system provides for training physicians at sanitary-epidemiological, therapeutic-prophylactic and scientific institutions in the methods and principles of work with such quarantine infections as plague, cholera, etc; this includes lectures and practical training according to a specific program (E. Yu. Gol'd et al., 1979; S. A. Velichko et al., 1978). However, this system cannot prepare staff personnels for work with especially dangerous viruses, including arenaviruses, since they are now investigated using different principles of laboratory-personnel work and safety.

In 1972 the Belorussian Scientific Research Institute of Epidemiology and Microbiology, having undertaken work with especially dangerous group I viruses, commenced training of personnel and creation of laboratory safety systems to assure safe work with these agents. In actuality, the system of routine and special personnel preparation arose in the process of developing and improving technological safety lines.

Extended experience in training laboratory personnel in the methods and principles of work with especially dangerous viruses permits several general conclusions. First of all is the preparation time. Two types of routine preparation should be distinguished: complete and accelerated courses with access to independent work with infected materials.

Preparation time was four to six months for research assistants and laboratory technicians lacking work experience under routine conditions. Staff personnel who did not have experience in the routine work, were trained for three to five months. Preparation time was also determined by the personnel category. The higher the qualification level of the specialist being trained, the longer the training. The system of preparation provided for differential training depending upon laboratory personnel categories: research assistants, average medical and engineering-technical personnel and the junior contingent, comprising autoclave operators and preparers. Thus, in the training of junior laboratory personnel the major emphasis was on following a routine and on specific practical work (detoxifying contaminated material and its subsequent utilization, animal care). The preparation of the engineering-technical personnel, in addition to study of the rules of the work routine and the observance of safety techniques as a whole, provided for training in setup and preventive maintenance of safety and scientific apparatus. Research staff personnel were trained mainly in topics of professional preparation depending upon the research problems and, also, observance of rules of safety techniques and work routine in the performance of specific laboratory investigations.

Newly arrived personnel were trained by the tutoring method by specialists in the same professional category but having greater practical experience in the work routine, under the leadership and control of the senior research personnel and laboratory heads. After training and the successful examination by a work commission, a training order in the institute authorized the undertaking of independent work with very dangerous viruses.

The experience of work in the preparation of personnel at work sites and, also, the need for a large number of specialists for work with especially dangerous viruses suggest the necessity of creating a more effective system for personnel training, scientifically-based and legalized within the framework of the Ministry of Health and taking into account the characteristics of work with especially dangerous viruses, using protective covers. This system should consist of theoretical and practical courses and should provide a differential preparation in relation to personnel category, contain lecture and practical material in accordance with the institutional program, and should be completed by an examination, whose results should determine conferral of an appropriate document, on the basis of which a worker will have access to work with especially dangerous viruses. Such a system of laboratory personnel training has been developed at the institute. It was described in detail in the respective programs and subject plans developed for each category of laboratory personnel.

The preparation of laboratory personnel is carried out in three main sections: mastery of the rules of safety techniques (fire safety, electrical equipment, pressure and vacuum apparatus, centrifuges and other equipment); mastery of the rules of routine work (training in the main principles of work under safe conditions, ability to start the necessary safety apparatus before beginning work, correct termination of work, including the detoxification of the work place, shutdown of safety apparatus, correct use of safety devices) and professional preparation (experimental work with laboratory

animals, animal care, setup and recording of serological, biochemical and virological reactions, training for the use of monitoring-measurement and other scientific equipment, training for work in setup and preventive maintenance of scientific and safety apparatus). In addition to this, the program includes the moral and psychological preparation of people for work. Our experience has convinced us of the need for conducting purposeful educational work in the preparation of convinced, risk-conscious persons, aware of the high degree of safety in a developed safety system. The psychological preparation of laboratory personnel attempts to develop in workers a state of inner calm and concentration during work with very dangerous viruses. The forementioned sections are also an integral and permanent part of worker preparation during the period of independent work.

The programs and subject plans are strictly differentiated in relation to the category of laboratory personnel (research assistants, engineering-technical workers, laboratory technicians, preparators and autoclave operators), both with respect to the subjects taught and in the relative time devoted to practical training and lecture material.

The complete training course for scientific workers comprised four to six months (one week for mastering the safety-technique rules, two weeks for mastering routine-work rules and three to five months for professional preparation); the accelerated course comprised three to five months (one week each for mastering safety-technique rules and training in the main principles of work under protected conditions and two to four months for professional preparation). For engineering-technical workers, laboratory technicians, preparators and autoclave operators the complete and accelerated training courses were three to four and two to three months, four to six and three to five months and three to four and two to three months, respectively. Most of the time was devoted to professional preparation. Mastering the safety-technique rules and training in the principles of work under protected conditions required no more than one to two weeks each. Individual groups of workers were trained as necessary for work with monitoring-measurement apparatus and he setup and preventive maintenance of scientific and safety equipment.

In the preparation of research staff personnel, the ratio of the number of hours of theoretical and practical work is 2:1. During theoretical training, information is presented on the epidemiology and medical geography of especially dangerous viruses, sources of infection, routes and factors of transmission, sanitary protection of an area, and so on. Furthermore, information is provided on safety techniques and the rules of routine work. During practical training, the students are trained in methods for the laboratory diagnosis of especially dangerous viruses, animal work and the setup of virological, serological and biochemical reactions. It is during this training that work is simulated with especially dangerous viruses. Possible emergency situations and measures to relieve extreme situations are developed in detail. At the end of the practical-training cycle a certain number of hours are provided for work directly with especially dangerous viruses in protected systems.

The preparation of engineering-technical workers differs somewhat from the preparation of research staff personnel. Great attention here is given to training for work in the setup and preventive maintenance of safety and scientific apparatus with regard for providing a high level of safety technique and a safe work routine. In the preparation of laboratory technicians and preparers, special emphasis is laid on practical training. Principal attention is given to methods for conducting laboratory investigations, the setup of virological, serological and biochemical tests, the preparation of glassware for work, care of laboratory animals, disinfection of infected material, etc.

Textbooks and visual aids (films, slides, posters, etc.) have a special role in improving the quality of the preparation of personnel for work with especially dangerous viruses. Unfortunately, these materials clearly are inadequate at the present time. Therefore, the creation of new educational aids is an extemeely important task, which if unsolved will make much more difficult the successful preparation and the reduction of the training time of specialists for work with especially dangerous viruses.

The practical realization of the proposed training scheme will make it possible to prepare various categories of laboratory workers for work with especially dangerous viruses and will liquidate the shortage of specialists of this profile.

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9942
CSO: 1840/353

UDC 616.12-082(47+57)

STATUS AND WAYS TO IMPROVE RSFSR CARDIOLOGIC SERVICE

Moscow SOVETSKOYE ZDRAVOOKHRANENIYE in Russian No 5, May 82
(manuscript received 20 Jan 82) pp 11-15

[Article by S. Ya. Chikin and A. S. Smetnev]

[Text] The decree "Measures for Further Improvements in Public Health" issued by the CPSU Central Committee and the USSR Council of Ministers has introduced substantial corrections into the development of the cardiologic service in the Soviet Union. This decree calls for the establishment, in a relatively short period of time in all of the Soviet republics, of a network of cardiologic outpatient centers, clinical departments with intensive care units and wards, consulting rooms at polyclinics, and specialist teams at medical emergency stations.

At the present time the sharp decrease in the morbidity and mortality due to infectious diseases and the marked increase in the pace of life has resulted in greater attention being focused on cardiovascular diseases. The public health services are concerned by the fact that at the present time more than half of the deaths in the population are caused by cardiovascular diseases. It is particularly noteworthy that the mortality of working-age man has increased in recent years.

In 1975 the mortality due to cardiovascular diseases in the RSFSR stood at 491.7 cases per 100,000; by 1980 this figure increased to 579.5 cases, i.e., an increase of 17.9%.

The mortality indicators are directly related to the level of morbidity; consequently, the figures in Table 1, which depict cardiovascular morbidity in the RSFSR during the 10th Five Year Plan, are of considerable interest.

Table 1 indicates that during the 10th Five Year Plan the incidence of rheumatism, diagnosed by a physician, decreased from 8.1 to 7.1 cases per 1000 persons in the population under study. Furthermore, the number of patients in whom the diagnosis was established for the first time decreased by a third; the corresponding figures for outpatient centers increased somewhat.

Incidence of hypertension increased by 15.8%.

The extent of outpatient care, although it has increased, remains unsatisfactory. Fully a third of the patients are not being seen on an outpatient basis.

During this period of time the incidence of ischemic heart disease has increased by 14.5%. The number of such patients being seen on an outpatient basis [i.e., at preventive dispensaries] has increased 1.7 fold during the five year period in question but, nevertheless, it is still low.

The incidence of obliterating endarteritis and thromboangiitis has increased by 16.7%. The number of such patients being seen on an outpatient basis, [i.e., at preventive dispensaries], although significantly higher than for the two diseases mentioned above, has remained at the same level for the last five years.

Diseases	Cases per 1000 persons				Under out-patient care (% of registered cases)			
	Total		Including first-time diagnoses		Total		Including first-time diagnosed patients	
	1975	1980	1975	1980	1975	1980	1975	1980
Rheumatism	8,1	7,1	0,3	0,2	98,1	98,8	92,8	95,2
Hypertension (all forms)	22,8	26,4	2,3	2,3	58,7	64,7	47,8	56,3
Ischemic heart disease without hypertension	11,0	12,6	1,2	1,2	27,5	46,1	34,2	50,6
Endarteritis, obliterating thromboangiitis	1,2	1,4	0,3	0,3	72,1	72,4	42,4	42,8
Myocardial infarction	0,6	0,7	0,4	0,6	92,6	92,9	92,0	92,2

Table 1. Patient visits and diagnoses

The incidence of myocardial infarction has increased by 16.7%. The number of such patients being seen at various health centers is the highest of the diseases in question (92.9%), but has increased by only 0.3% in the last five years.

Consequently, Table 1 shows need for a maximum effort to place such patients under the care of the outpatient health centers. Otherwise it will be impossible to institute timely treatment at the polyclinics or infirmaries intended to prevent the development of serious sequelae.

Current scientific thinking holds that the increase in the incidence of the most important cardiovascular diseases is related to urbanization, an increase in the pace of life, industrial automation and more complicated occupational processes which lead to greater mental stress and markedly reduce physical activity. Other risk factors include a change in the nature of nutrition, environmental pollution, widespread smoking, and alcohol abuse. The change in the age structure of the population is also very important: the percentage of the aged and the very old in the population has increased.

Indicator	1975	1980
Number of departments (consulting offices) at polyclinics:		
Cardioheumatologic	2168	—
Cardiologic	—	1085
Rheumatologic	—	1738
Number of hospital beds:		
Cardiorheumatologic	22 200	—
Cardiologic	—	30 917
Rheumatologic	—	7039
Heart surgery	1493	2282
Vascular surgery	1322	2418
Staff breakdown of cardiorheumatologists:	2944	—
Cardiologists	—	2911
Rheumatologists	—	2035

Table 2. Development of the cardiologic network in the RSFSR from 1975 to 1980.

During the last five-year plan (1975-1980) the RSFSR Ministry of Health and the various public health agencies and institutions of the RSFSR have conducted extensive programs for further improving the cardiologic service in the RSFSR. (Table 2).

The data which are given indicate the significant increase in the number of cardiologic and rheumatologic departments and consultation rooms at the polyclinics. In 1975 the number of cardiologic and rheumatologic consulting rooms has increased to 1,085 and 1,738, respectively.

The number of beds at cardiorheumatologic infirmaries was 22,200 in 1975, while in 1980 the number of cardiologic beds was 30,917 and the figure for rheumatologic beds was 7,039.

There was a particularly significant increase in the number of cardiosurgical beds and those devoted to vascular surgery, an increase from 1493 to 2282 and from 1322 to 2418, respectively.

Consequently, the 10th Five Year Plan was quite significant for the development of the cardiologic service in the RSFSR.

In recent years, medical care was organized on the principle of succession and staging, which was first developed in Leningrad. This system is primarily concerned with the provision of continuous service to patients with myocardial infarction. The following stages in the care have been established: pre-hospital (polyclinic and the emergency cardiologic temm), hospital care (special cardiologic departments with intensive care wards and units) and treatment at sanatoria (i.e., a cardiologic sanatorium). At the present time 262 special cardiac emergency teams have been established in the RSFSR.

The creation of such specialized emergency cardiologic teams has led to definite success in the timely diagnosis and treatment of acute myocardial infarction. 60-70% of the patients are hospitalized during the first day of onset of acute cardiovascular disease.

In recent years considerable practical advances have been made in health care delivery to patients with acute coronary insufficiency prior to hospitalization by the use of telemetric transmission of EKG to a consultation center. Such telemetric consultation centers have been created in Saratov, Volgograd and Gor'kiy.

The health delivery agencies also accord considerable attention to the administration of hospital-based care for patients with cardiovascular pathology.

In the RSFSR measures are being effected on the reorganization of the cardiorheumatic services, with the separation of the cardiologic offices into independent entities at the polyclinics and the development of measures to increase the effectiveness of the cardiologists and the cardiologic service. New cardiologic services, consisting of 340 to 360 beds, have been established in Moscow, Leningrad, Izhevsk, Perm, and Orenburg. In 1980 a Scientific Research Institute of Cardiology was created in Leningrad with a branch at the Saratov Medical Institute.

Considerable attention is being accorded to the intensive care units within the hospital setting. The cardiologic department with intensive care unite in Moscow, Leningrad, Sverdlovsk, Saratov, Barnaul, Gor'kiy, Volgograd, etc., have been provided with modern therapeutic and diagnostic instruments which allow dynamic 24 hour monitoring of the patients and assure timely care in such serious complications of myocardial infarction as cardiogenic shock, pulmonary edema, and ventricular fibrillation. 80 to 90% of the patients with acute myocardial infarction are hospitalized in the special cardiologic departments in Saratov, Kuybyshev, Sverdlovsk, and Murmansk.

A principally new stage in the organization of extra-hospital medical assistance has been the creation of hospitals for emergency medical care [skoraya meditsinskoy somoshchi]. At the present time in the RSFSR they contain 45 cardiologic departments consisting of 2,700 beds.

Despite everything that has been said above, the organization and the quality of medical assistance rendered to cardiovascular patients requires further improvements. In many areas the emergency services are short-staffed; furthermore, in some cities the cardiologic emergency teams are utilized for routine purposes.

The network of hospitals for emergency care is also inadequate; these hospitals have not as yet become administrative centers for providing outpatient and emergency care, which is due to failure to properly allocate the available beds in a number of cities (Tula, Omsk, Orel, etc.)

In certain areas the network of specialized cardiologic departments has not been adequately developed, and mortality due to myocardial infarction remains high.

Maximum attention must be accorded to the care given to the cardiovascular patients at the polyclinic stage; this includes close observation of patients at a particularly risk, improvements in the prevention of ischemic heart disease, outpatient follow-up of patients who had sustained a myocardial infarction, as well as of patients with other cardiovascular diseases.

Outpatient follow-up of patients at risk of ischemic heart disease is particularly important for the prevention of sudden death, the incidence of which is quite high at the present time among working-age individuals. Reorganization of the cardiorheumatologic services, which began in 1978, has improved the quality of care given to cardiovascular patients; in 1978-1979, in particular, outpatient follow-up of hypertensives has increased greatly.

Nevertheless, in certain areas of the RSFSR there is no timely and correct diagnosis in the early stages of the disease, which to a large extent is due to inadequate provision of the polyclinics with the required instruments and laboratory equipment.

At the present time attempts are being made to discover more efficient forms of outpatient care. In the medical-sanatoria sections and polyclinics in Chelyabinsk, Sverdlovsk, Kemerovo, Perm, and Yaroslavl' oblasts, as well as in the Udmurt and Bashkir ASSR, a five-group system of outpatient treatment has been introduced. In this system the contingent under outpatient care consist not only of patients with long term or chronic diseases, but also healthy workers.

Considerable attention is being accorded to the further improvements in the medical care given to industrial workers engaged in the construction and transportation industries as well as to agricultural laborers.

A particularly important task of the cardiologic offices at polyclinics is the early diagnosis of cardiovascular disease; this is intimately related to rendering timely assistance and making a decision regarding the need for hospitalization. In the pre-hospital stage this is largely the responsibility of uchastok therapeutists; consequently, it is very important that they be highly qualified in cardiology, particularly in the utilization

of modern instruments and laboratory-based diagnosis of myocardial infarction.

The cardiologic offices that have been created should provide expert consultation to the uchastok therapeutists and assist in increasing the professional qualifications of the latter.

An important stage in the treatment of cardiovasuclar patients consists of rehabilitation, which is particularly important in patients that have sustained a myocardial infarction. In the USSR, successive stages have been introduced in the rehabilitation of patients that have sustained a myocardial infarction; following treatment in a hospital, they are transferred to a special sanatorium department and subsequently are treated on an outpatient basis. The step-wise rehabilitation of patients with a myocardial infarction has been used successfully in Leningrad, Moscow, Gor'kiy, Kuybyshev, Chelyabinsk, Saratov, etc.

The results of completion of the cure at a sanatorium have improved significantly in the RSFSR; the number of patients who have been discharged with significant improv ment was 1.5 times greater in 1981 that in 1979.

However, the organization of a rehabilitation service for patients with cardiovascular diaeases, particularly in the polyclinics, requires further improvements. At a number of hospitals little use is made of physical therapy, as a result of which the patients are not prepared adequately in the physical sense for rehabilitation at a sanatorium.

An extremely important measure consists of increasing the qualifications of the cardiologists and therapeutists in terms of early diagnosis, modern therapy, and prevention of cardiovascular diseases. Every year the qualifications and specialization of over 2,000 physicians are further improved at central and local institutions. The State Institute for the Advanced Training of Physicians imeni S. M. Korov participates actively in the postgraduate courses, scientific and practical conferences, and consultations in current problems in cardiology organized at medical institutes [colleges].

In order to enhance the introduction of scientific advances into medical practice a scientific council on cardiovascular diseases has been created at the RSFSR Ministry of Health. This council has developed a unified republic plan for research, which involves 43 medical and scientific-research institutes. Studies on "Arterial Hypertension and Atherosclerosis", " "Ischemic Heart Disease", "Arrhythmia" and many other studies conducted at the Second Moscow Medical Institute imeni N. I. Pirogov, the Sarabov, Ishevsk, Irkutsk, Gor'kiy, and Tomsk medical institutes, and the Moscow Medical Emergency Scientific Research Institute imeni Sklifosovskiy, are directed to resolution of problems of etiology, pathogenesis, diagnosis, treatment, and the most effective methods of prevention.

The creation of the republic institute of cardiology and of its branch is a new step in the further development of the cardiologic service. Scientists in Leningrad and Saratov are working on developing and improving diagnostic

methods for the principal cardiovascular diseases which make use of computers and mathematics, methods which would be suitable for mass screening of the population and the identification of individuals at risks of ischemic heart disease or myocardial infarction.

Studies are being conducted on the development of methods to assure automated management of hypotension therapy.

Further strengthening and improvements in the cardiologic service of the RSFSR should be based on improvements in the staging of cardiologic care, improvements in early diagnosis of cardiovascular diseases, improvements in the efficiency of the outpatient services, and the implementation of measures for primary and secondary prevention of ischemic heart disease. A considerable role in this work belongs to the chief cardiologist and therapeutists who, on the basis of the morbidity figures, should make plans for improvement in all the aspects of the cardiologic service.

Adherence to the measures outlined above will undoubtedly lead to improvements in the prevention of cardiovascular diseases in the RSFSR.

12172
CSO: 1840/318

UDC 613.6-057:622(47+57-17)

INDUSTRIAL HYGIENE IN THE MINES OF THE FAR NORTH

Moscow GIGIYENA I SANITARIYA in Russian No 3, Mar 82 (manuscript received 15 Apr 81) pp 18-21

TIMOKHIN, D. I., Moscow Scientific Research Institute of Hygiene imeni F. F. Erisman

[Abstract] A survey was made of the hygienic conditions under which miners work in several climatic regions of the Soviet Far North. On an over all basis the miners showed physiologic changes occurring over a period of several years which were interpreted to indicate adaptation to the occupational conditions and the permafrost; the climate also modified the manifestations of occupational diseases common to such workers, e.g., pneumoconioses. References 12 (Russian).
[321-12172]

UDC 616.1-057:622:614.374

HYGIENIC KNOWLEDGE AND BEHAVIOR OF DONBASS COAL MINERS WITH CARDIOVASCULAR DISEASES

Moscow GIGIYENA I SANITARIYA in Russian No 3, Mar 82 (manuscript received 28 Sep 81) pp 40-42

VINARIK, E. M., Donetsk Scientific Research Institute of Industrial Hygiene and Occupational Diseases

[Abstract] A questionnaire study was conducted on the health attitudes and knowledge of healthy coal miners and those with cardiovascular pathology. The results showed that as a rule the miners are poorly informed as to basic health questions both in general terms and in specifics pertaining to occupational diseases, although those with diagnosed cardiovascular diseases are more knowledgeable as a result of contact with medical personnel. It is obvious that greater efforts must be made by the appropriate medical personnel to make miners aware of good health practices and measures that

can be undertaken to minimize the risk of occupational diseases. As a rule, the knowledge that the Donbass coal miners do possess was obtained at their own initiative.
[321-12172]

UDC 615.919:591.145.2

REGULATORY ACTION OF BEE VENOM ON HUMORAL IMMUNITY SYSTEM

Moscow BIOLOGISHESKIYE NAUKI in Russian No 4, Apr 82 (manuscript received 9 M r 81) pp 41-45

ORLOV, B. N. and ROMANOVA, Ye. B., Department of Physiology and Biochemistry of Man and Animals, Gor'kiy State University imeni N. I. Lobachevskiy

[Abstract] The effect of bee venom on the system of immunogenesis has not previously been studied in depth. The authors obtained melittin and studied its effects on the humoral immunity system by injecting bee venom in mice after immunization in doses of 2.5, 5.0, 7.5, 10.0, 20.0 and 80.0 mcg per 20 grams of mass, 48 and 24 hours after they had been injected with 20.0 mcg of melittin, and also 24 and 48 hours after they were given antigens. Results showed that bee venom had a pronounced inhibiting effect on the quantity of rosette-like lymphocyte formation compared to the control mice, with the concentration of the bee venom having a role. Lower doses (5-10 mcg) as well as high ones suppressed the accumulation of antibody-forming cells in the spleen, with less concentrated forms of venom having a greater suppressing effect. Comparison of agglutinin titers showed that all but the smallest doses suppressed production of specific antibodies. Another series of tests showed that the venom's effects depended on the time of injection, with that given before immunization having a greater effect than that administered after immunization. Variations in effect were related to varying sensitivity of individual elements of the lymphoid tissue. The bee venom was thought to restructure the immunological status of the organism, suppressing some actions while stimulating others. References 21: 14 Russian, 7 English.
[298-12131]

UDC 616.831-002-022:578.833.26]-07

DIAGNOSIS OF BIUNDULANT TICK-BORNE ENCEPHALITIS

Moscow SOVETSKAYA MEDITSINA in Russian No 4, Apr 82 (manuscript received 8 Jun 81) pp 7-10

BUNIN, K. V. and BELOBORODOVA, N. M., Infectious Diseases Clinic, First Moscow Medical Institute imeni I. M. Sechenov

[Abstract] During the period 1976-1980 a total of 114 patients (78 men, 36 women, aged 16-76) with biundulant tick-borne encephalitis were observed

at the Izhevsk Clinical Hospital. Symptoms in patients admitted during the first febrile epidode included headache, pain during movement of the eyeball, nausea, vomiting, and hydrosis, with temperatures elevated to 38-39°C. Some patients vomited copiously (5-6 times daily), and many complained of weakness in the arms and legs, the back muscles and the lumbar region. Sleep was disturbed. In patients with the meningeal form, meningeal symptoms were moderate. Rigidity of the occipital muscles was observed in 20% of cases. In patients with the focal form, hemiparesis and paresis, tremor and convulsions were also seen in some patients, together with nystagmus and impairment of the tendon reflexes. Diagnosis was possible during the first febrile episode from clinical findings and the results of biochemical studies of the cerebrospinal fluid. Onset of the second febrile episode was acute with more marked clinical symptoms of intoxication and rapid involvement of various parts of the nervous system. The second episode was always more prolonged than the first (8-9 days against 3-5) and fever was a degree higher. Extensive use was made of immune response studies for diagnosis: diffuse gel precipitation, hemagglutination inhibition and complement fixation tests. Use of these methods improved reliability in diagnosis by 25.4%. Diffuse gel precipitation and the hemagglutination inhibition test were equally sensitive but the former was more specific and can be recommended in diagnostic practice. References 6 (Russian).
[312-9642]

UDC 616.981.42-036.11-07:616.153.06

CLINICAL ASSESSMENT OF CHANGES IN BLOOD SERUM PROTEIN IN PATIENTS WITH ACUTE BRUCELLOSIS

Moscow SOVETSKAYA MEDITSINA in Russian No 3, Mar 82 (manuscript received 30 Oct 80) pp 49-53

OSTROVSKIY, N. N., RUBTSOV, I. V., GORSHKOVA, V. I. and SMYZGOVA, A. V., Department of Infectious Diseases, Moscow Medical Institute of Stomatology; USSR Ministry of Health Central Scientific Research Institute of Epidemiology

[Abstract] Serum protein studies were done in patients with acute brucellosis using the method of disc electrophoresis in polyacrylamide gel, which was found to be more sensitive than other methods. Studies were done on 50 adults between days 4 and 65 of the disease, which had been confirmed by serologic investigations. Patients were receiving broad-spectrum antibiotics and desensitizing agents and anelgesics. Determinations were made of prealbumin, albumin, alpha 1-globulin, ceruloplasmin, transferrin, and gamma and alpha 2 globulins. The most significant changes (redistribution of albumin and globulin fractions, reduced transferrin and fast globulins, increased slow globulins, ceruloplasmin and prealbumin) seen in the generalized phase of the disease were maintained for 2 months following remission. Protein shifts corresponded with allergic changes in the acute period. Rifampin did not appear to exert any marked effedt on serum protein shifts. Figures 1; references 10 (Russian).
[315-9642]

UDC 617-001.4-06:616-056.43]-085.272:547.962.5]-092.9-07:616.155.3

RESPONSE OF PERIPHERAL BLOOD LEUKOCYTES TO PHYTOHEMAGGLUTININ WOUND TREATMENT IN RABBITS WITH DIFFERENT TYPES OF DELAYED HYPERSENSITIVITY REACTIONS

Moscow BYULLETEN'EKSPERIMENTAL'NOY BIOLOGII I MEDITSINY in Russian Vol 93, No 3, Mar 82 (manuscript received 6 Apr 81) pp 106-110

LINDNER, D. P., POBERIY, I. A. and BOL'SHAKOV, I. N., Morphology Department, Central Scientific Research Laboratory, and the Chair of Operative Surgery and Topographic Anatomy, Second Moscow Medical Institute imeni N. I. Pirogov

[Abstract] Rabbits with strong and weak delayed hypersensitivity reactions (DHR) to phytohemagglutin (PHA) were employed in tests on the therapeutic efficacy of PHA in the treatment of experimental skin wounds. Preliminary studies showed that the white cell counts in both groups were comparable, with the exception of low monocyte counts and compromised neutrophil phagocytic activity in the weak DHR rabbits. The strong DHR rabbits responded to the wound with leukocytosis and the appearance of transformed lymphocytes at the site of injury, whereas the weak DHR rabbits showed no evidence of leukocytosis and eventually developed leukopenia. The monocytic response was essentially equivalent in both groups, but less pronounced in the weak DHR animals because of the depressed monocyte counts. Treatment of the wound site with PHA emulsion had essentially no significant effect on the cell response or healing, while in the weak rabbits PHA application improved most leukocytic indicators without actually enhancing phagocytosis and shortened the healing time from 32.2 days to 20.1 days (vs. 23.5 days in strong DHR rabbits). The effectiveness of PHA was therefore primarily due to activation of the monocytic line of cells. Figures 2; references 13: 6 Russian, 7 Western.
[324-12172]

UDC 362.121:614.2

PUBLIC OPINION ON URBAN POLYCLINIC: QUESTIONNAIRE STUDY

Moscow SOVETSKOYE ZDRAVOOKHRANENIYE in Russian No 2, Feb 82 (manuscript received 7 Jul 81) pp 48-54

ORLEAN, G. Ya., candidate of medical sciences, POPOV, G. S., SOLOMONOV, S. L., candidate of technical sciences, AUSTRUMA, B. P. and YABLONSKAYA, L. F., Latvian SSR Ministry of Health; Riga Medical Institute; Riga Polyclinic No 1

[Abstract] Patients seen at the Riga Polyclinic No 1 were requested to fill out questionnaires regarding their impression of the services, effectiveness, and personnel at the clinic in order to determine factors which would be utilized in improving the image and the service rendered to the community by the clinic. Results indicated that questionnaire sampling is an effective means of eliciting information from the patients, on the

basis of which the services and practices could be adjusted to better meet patient needs. In particular, an important factor was in adjusting the evening hours to serve the working population, and more efficient and responsive outpatient and geriatric services which decreased the time expended in treating and processing patients in the latter two categories.
References: 3 Russian.
[322-12172]

UDC 615.339:578.245].036.8

RESOLUTION OF ANTIVIRAL AND CERTAIN NONANTIVIRAL ACTIVITIES IN INTERFERON

Moscow IMMUNOLOGIYA in Russian No 2, Mar-Apr 82 (manuscript received 13 Jul 81) pp 43-47

TIMOFEYEV, I. V., KUZNETSOV, V. P., SLAVINA, Ye. G., MEKHEDOV, L. N., DOBRYNIN, Ya. V. and ORLOVA, T. G., Institute of Epidemiology and Microbiology imeni N. F. Gamaleya, USSR Academy of Medical Sciences; All-Union Oncological Center, USSR Academy of Medical Sciences, Moscow

[Abstract] An attempt was made to isolate antiviral activity in interferon from two nonantiviral activites, namely antiproliferative activity and natural-killer stimulating activity, in order to clarify molecular relationships in interferon activity. Native human leukocyte interferon with an antiviral activity of 10^4 units per milliliter and a specific activity of $4 \cdot 10^3$ units per 1 milligram protein was cultured in a primary culture of human embryo fibroblasts, CaOv cells, K-562 human myeloleukemia cells and normal human leukocytes. Human leukocyte material was treated with sodium dodecyl sulfate followed by chromatography using G-25 Sephadex, which redistributed the three activities. Antiviral activity was seen only in high-molecular fractions, which also showed definite antiproliferative and natural-killer stimulating activity. Low-molecular fractions also revealed antiproliferative and natural-killer stimulating activity but antiviral activity was absent in these fractions. Natural-killer stimulating activity was retained in low-molecular fractions only when human leukocyte interferon was treated at 100°C. The findings suggest that antiproliferative activity and natural-killer stimulating activity may be structural components of the interferon molecule. Figures 3: references 15: 2 Russian 13 Western.
[369-9642]

UDC 612.017.1.014.46:615.919:595.46

EFFECTS OF SCORPION VENOM ON MOUSE HUMORAL IMMUNITY

Moscow BYULLETEN' EKSPERIMENTAL'NOY BIOLOGII I MEDITSINY in Russian Vol 93, No 3, Mar 82 (manuscript received 25 Mar 81) pp 74-76

ORLOV, B. N. and ROMANOVA, Ye. B., Chair of Human and Animal Physiology and Biochemistry, Gor'kiy State University imeni N. I. Lobachevskiy

[Abstract] The effects of scorpion (Buthus caucasicus) venom on humoral immunity were studied in white mice immunized with sheep erythrocytes. The effects of intraperitoneally administered venom were variable and time and dose dependent. Treatment with the venom 48 h prior to immunization had no effect on splenic antibody forming cells, while injection at the time of immunization, or 48 h after, eigher increased the number of such cells (0.5-2 mg/kg of venom) or inhibited their formation (3 mg/kg). The number of rosette-forming cells in the peripheral blood was depressed by low doses of the venom (0.25-1 mg/kg) and increased by higher doses (2-3 mg/kg), regardless of whether the venom was administered before, after, or during immunization. The findings indicate that the scorpion venom had no effect on immunocompetent cells in the G. phase of the cell cycle, but affected antigen-stimulated and blast cells. The variable effects can be ascribed to the venom's known interaction with adreno- and cholino- reactive structure, depending on time and dose factors. Figures 3; references 12: 5 Russian, 7 Western.
[325-12172]

UDC: 612.83

SIGNIFICANCE OF NEUROTOXIN PHOSPHOLIPASE ACTIVITY IN THEIR PRESYNAPTIC ACTION

Moscow BIOLOGICHESKIYE NAUKI in Russian No 3, Mar 82 p 108

[Abstract of article by M. V. Kondashevskaya, Ye. R. Martynova and M. L. Miroshnichenko, filed with the All-Union Institute of Scientific and Technical Information, file No 5434-80]

[Text] A study was made of the effects of chemically modified analogues of phospholipases A_2 from cobra venom (CP) and bee venom (BP) wanting in phospholypase activity on presynaptic activity of motor nerve endings of diaphragmatic muscles to demonstrate their structural and functional distinctions.

Appreciable presynaptic action was found in the modified compounds with elevated hydrophobia of molecules (CP treated with enanthic anhydride, BP modified by nitration of tyrosine residue in third position, BP dimer). Substances that deprive the toxin of the ability to be sorbed on presynaptic membranes of nerve endings concurrently interrupt the presynaptic effect of toxins (shielding of NH_2 groups of CP by acetylated radicals, depriving BP of binding center by treatment of arginine residue with acetylacetone, change in spatial structure of BP protein molecule upon oxidation of all tryptophan residues). The findings indicate that the toxic properties of modified BP and CP are determined by the combination of enzymatic and superficial activity. Phospholipase properties are not a mandatory condition for manifestation of their toxic effect.

10,657
CSO: 1840/299

UDC 612.821.6+612.821.7+612.822.3

ELECTROENCEPHALOGRAPHIC CORRELATES OF DIFFERENTIATING VERBAL STIMULI DURING NATURAL NIGHT SLEEP IN HUMANS

Moscow ZHURNAL VYSSHEY NERVNOY DEYATEL'NOSTI IMENI I. P. PAVLOVA in Russian
Vol 31, No 4, Jul-Aug 81 (manuscript received 10 Jun 80) pp 839-841

ARONS, Ye. K. and VASIL'YEVA, V. M., Department of Physiology of Higher Nervous Activity, Moscow State University imeni M. V. Lomonosov

[Abstract] Previous studies of EEG measurements have indicated that reactions to stimuli during sleep depend not only on the physical parameters of the stumuli, but also on their individual meaning. The authors studied the human brain's reaction to specific words and information of semantic or phonetic similarity. EEGs, electrooculograms and electromyograms of the neck muscles of ten subjects were recorded during 2 nights in a soundproof chamber. Verbal stimuli that had previously been recorded were presented every 30-60 seconds at 25 decibles above the hearing threshhold. Two-syllable words with final stress were read at a steady intonation. EEG and other data were averaged, by subject and for the whole group, and statistical analysis was made using the Wilcoxson-Mann-Whitney non-parametric criterion. Results showed that as slow-wave sleep developed the length of EEG reactions grew, and that the length of EEG activation was longer during NREM than during REM. Third, at all stages the length of EEG activation by the word "sapog" (shoe) was somewhat longer than for other stimuli, with the exception of reaction in stage 1. Thus it is obvious that the human brain retains the ability to differentiate between verbal stimuli during sleep, with a higher perception threshhold and a somewhat weakened analytical capability. References 9: 3 Russian, 6 English.
[296-12131]

UDC 612.822.3

FEATURES OF FREQUENCY STRUCTURE OF EVOKED POTENTIALS IN DIFFERENT PARTS OF HUMAN CEREBRAL CORTEX

Moscow ZHURNAL VYSSHEY NERVNOY DEYATEL'NOSTI IMENI I. P. PAVLOVA in Russian Vol 31, No 4, Jul-Aug 81 (manuscript received 17 Oct 80) pp 845-847

SHCHEKUT'YEV, G. A. and KOPTELOV, Yu. M., Institute of Higher Nervous Activity and Neurophysiology, USSR Academy of Sciences, Moscow, and Institute of Control Problems, USSR Academy of Sciences, Moscow

[Abstract] Studies of spacial distribution of evoked potentials to light have paid little attention to the spectral composition of those potentials. The authors studied amplitudinal frequency features of visual evoked potentials according to spectral indicators, and their features in various parts of the cerebral cortex. Eleven healthy subjects were shown light flashes lasting 3 ms, at an intensity of 0.45 joule/flash, with 1.2 seconds between flashes, and at a distance of 1 meter eye to light. EEG and evoked potential readings were taken. Visual analysis of evoked potential spectra reveals considerable levelling, which is explained by the short duration as a transition process. Study of inter-hemispheral asymmetry showed differences that, as a rule, related to amplitudinal features, and which were more pronounced in the alpha- and beta-ranges. As a whole, the test subjects showed considerable variation in their responses. Integral parameters for analyzing evoked potential spectra were found to be suitable for statistical processing, which revealed varying directions of gradual changes in expression of slow (delta- and theta-) and rapid (alpha- and beta-) components of visual evoked potential, moving from the back of the head to the frontal sections of the cortex lobe. Figure 1; references 8: 2 Russian, 6 English. [296-12131]

UDC 615.814.1+615.844.4].015.4:612.884

EFFECTS OF ACUPUNCTURE ON INTEGRATION OF NOCICEPTIVE AND NON-NOCICEPTIVE AFFERENT SIGNALS IN SECOND SOMATOSENSORY REGION OF CEREBRAL CORTEX

Moscow BYULLETEN' EKSPERIMENTAL'NOY BIOLOGII I MEDITSINY in Russian Vol 93, No 3, Mar 82 (manuscript received 19 May 81) pp 11-12

RESHETNYAK, V. K., MEYZEROV, Ye. Ye. and DURINYAN, R. A., Central Scientific Research Institute of Reflexotherapy, Moscow

[Abstract] Electrophysiologic studies were conducted on anesthetized cats to determine the effects of auricular acupuncture (1.2 msec 3 Hz stimuli up to 14 mA for 15-30 min) on evoked potentials (EP) in the second somatosensory zone in response to nociceptive (electrical stimulation of dental pulp) and non-nociceptive (stimulation of the lower lip) afferent signals. The results showed that nociceptive signals depressed the positive amplitude

of the EP by 40% for ca. 50-60 min, while the non-nociceptive stimuli increased the EP amplitude by 75% for 15-20 min. The inhibitory effects of the nociceptive stimuli were abolished by naloxone (5 mg/kg i.p.), and, by direct electrostimulation of the second somatosensory zone, the EP in the parafascicular thalamic complex were attenuated. The data were interpreted to indicate that the second somatosensory zone modulates the conduction of nociceptive signals along the specific and nonspecific projections. Figures 3; references 11: 2 Western, 9 Russian.
[324-12172]

UDC 615.254.015.2:615.835.12].015.4:[616.611+616.61-018.1

EFFECTS OF DRUGS AND HYPERBARIC OXYGENATION ON JUXTAGLOMERULAR APPARATUS AND INTERSTITIAL CELLS OF RENAL MEDULLA IN RABBITS

Moscow BYULLETEN' EKSPERIMENTAL'NOY BIOLOGII I MEDITSINY in Russian Vol 93, No 3, Mar 82 (manuscript received 4 Sep 81) pp 119-122

PAL'TSEV, M. A., YESILEVSKYY, Yu. M., CHASOVNIKOVA, N. N. and SHUMKINA, L. M., Chair of Pathologic Anatomy, First Therapeutic and Sanitary-Hygiene Faculties, and the Chair of Urology, First Moscow Medical Institute imeni I. M. Sechenov

[Abstract] Experiments involving rabbits were used for an electron microscopic analysis of the effects of clinically-used renal drugs on the juxtaglomerular apparatus and the interstitial cells, as well as analysis of the effects of hyperbaric oxygenation (0.5 atm). Mathematical evaluation of the various electron-dense granules showed that hyperbaric oxygenation and venoruton, indomethacin, and trental led to marked accumulation of the granules within 3 h, followed by a return to normal levels within 24 h after administration. Furosemide induced granule accumulation for 24 h. Temporal variations in the accumulation of the various granules reflecting synthetic activity represented the different mechanisms of action of the various preparations. Figures 1; references 10: 4 Russian, 6 Western.
[324-12172]

UDC 612.766.2-06:[612.74+612.66

EFFECTS OF HYPOKINESIA ON BODY WEIGHT AND SKELETAL MUSCULATURE IN RATS

Moscow BYULLETEN' EKSPERIMENTAL'NOY BIOLOGII I MEDITSINY in Russian Vol 93, No 3, Mar 82 (manuscript received 19 Jun 81) pp 118-119

KOCHEREZHKINA, E. V., Evolutionary Histology Laboratory, Institute of Evolutionary Morphology and Animal Ecology imeni A. N. Severtsov, USSR Academy of Sciences, Moscow

[Abstract] The effects of hypokinesia on body weight and skeletal musculature were investigated on young (110-130 g) outbred rats subjected to various degrees of immobilization. The results showed that completely immobilized

rats lost weight from the 2nd to the 3rd week (125 and 119 g mean weight, respectively). Partially immobilized animals showed a weight of 180 g after 2 months, and control animals 330 g ($P < 0.001$). Differences in the weight of the gastrocnemius muscle were also statistically significant ($P < 0.001$), and showed that the diameter of the muscle fibers in the hypokinetic animals was smaller than in the control animals (41.6 μm vs 46.2 μm; $P < 0.05$). These findings demonstrate that prolonged hypokinesia affects both overall body weight as well as that of individual muscles. Figures 2; references 14 (Russian).
[324-12172]

UDC 615.384.015.2:615.835.12].015.44:616.1/.4-091.8

HEMODILUTION-INDUCED CHANGES IN VISCERA UNDER HYPERBARIC OXYGENATION

Moscow BYULLETEN' EKSPERIMENTAL'NOY BIOLOGII I MEDITSINY in Russian Vol 93, No 3, Mar 82 (manuscript received 2 Jul 81) pp 110-112

YEFUNI, S. N., corresponding member, USSR Academy of Sciences, SHIMKEVICH, L. L., TEPLYAKOV, V. G. and DEREVYANKO, T. P., Hyperbaric Oxygenation Center, All-Union Surgery Science Center, USSR Academy of Medical Sciences; Clinical Diagnostic Laboratory, Institute of Surgery imeni A. V. Vishnevskiy, USSR Academy of Medical Sciences, Moscow

[Abstract] Histologic and histochemical changes in the internal organs were evaluated as a response to blood replacement by dextran plasma expander in dogs under hyperbaric (3 atm for 2 h) oxygenation. The results showed that reduction of the hemoglobin concentration to 0.5-2.5 g% induced changes in the microcirculatory system of the various organs (brain, heart, liver, kidneys, lungs) characteristic of increased permeability and promoted enhanced glycolytic activity. Reperfusion of the animals with whole blood led to complete renormalization within 7-14 days. These findings indicate that improvements in the plasma expander designed to eliminate or minimize alterations in capillary permeability should render such procedures clinically useful under conditions of hyperbaric oxygenation. Figures 1; references 6: 3 Western, 3 Russian.
[324-12172]

UDC 612.766:612.66

AGE-RELATED FEATURES OF HUMAN FATIGUE DURING REGIONAL MUSCULAR EXERTION

Kiev FIZIOLOGICHESKIY ZHURNAL in Russian Vol 28, No 2, Mar-Apr 82
(manuscript received 25 Feb 80) pp 230-235

ALFEROVA, T. V., Institute of Physical Culture, Chelyabinsk

[Abstract] Ergographic studies were conducted on dynamic (finger weight lifting) and static (finger support of a suspended weight) regional muscle exertion, fatigue induction, and the attendant autonomic correlates as determined by EKG examination, oxyhemography, blood pressure and heart rate determinations. Subjects ranged in age from four to over 90 years. Age-related differences in muscular efficiency, endurance, and onset of fatigue were uncovered, Endurance was lowest in the very young and the aged, and highest in the young and the other age groups. The predominant response in the 9-10 year olds consisted of an increase in the heart rate, whereas adolescents and adults responded with blood pressure elevation. These parameters were virtually unchanged in the aged after exercise. In 8-11 year old pupils (classes II to IV) the mental fatigue induced by 4-5 lessons was reflected in depressed capacity for physical exertion. These findings lend credence to the belief that age-related factors in the CNS significantly influence regional motor performance. Figures 4; references 14: 2 Western, 12 Russian.
[326-12172]

UDC 612.821.3

INTEROCEPTIVE INFLUENCE ON HYPOTHALAMIC SELF-STIMULATION

Kiev FIZIOLOGICHESKIY ZHURNAL in Russian Vol 28, No 2, Mar-Apr 82
(manuscript received 1 Dec 80) pp 236-239

RAYTSES, V. S. and YEMEL'YANENKO, I. V., Chair of Normal Physiology, Ivano-Frankovsk Medical Institute

[Abstract] Investigations on albino rats were designed to delineate the effect of interoceptive input on hypothalamic (ventromedial nucleus) self-stimulation, i.e., on the emotional state of the animals. The results showed that peroral administration of 5 ml of 0.5% HCl or of 6% sodium bicarbonate to stimulate gastrointestinal chemoreceptors led to an increase in the rate of self-stimulation by 18.3% to 31.5%, particularly within the first half hour. The results with the bicarbonate were much more variable, however. After 1.5 to 2 h backround levels of stimulation were resumed. Stimulation of rectal mechanoreceptors with a thin-walled balloon led to complete inhibition of self-stimulation and other behavioral changes. These observations confirm and expand the contention that animal behavior is affected by interoceptive input that either inhibits or stimulates CNS formations. Firures 2; references 21: 7 Western, 14 Russian.
[326-12172]

UDC 612.822.1:612.273

MECHANISMS OF TOXIC EFFECTS ON BRAIN OF HYPERBARIC OXYGENATION

Moscow BIOLOGICHESKIYE NAUKI in Russian No 5, May 82 (manuscript received 29 Dec 81) pp 26-30

KAGAN, V. Ye., KOPALADZE, R. A., PRILIPKO, L. L., LIBE, M. L., TUROVA, N. F. and KOZLOV, Yu. P., Laboratory of Physical Chemistry of Biomembranes, Moscow State University imeni M. V. Lomonosov

[Abstract] Biochemical studies on the cerebrocortical tissue of albine rats exposed to hyperbaric oxygenation (5 atm) showed that such treatment activated lipid peroxidation and led to convulsions. Pretreatment of the animals with alpha-tocopherol acetate or 4-methyl-2,6-di-tert-butylphenol (MBP) abrogated the accumulation of the peroxidation products and reduced the incidence of convulsions. Feeding the animals with a mixture of unsaturated fatty acids (oleic:linoleic:linolenic:arachidonic = 1:2:2:1) promoted an increase in the incidence of convulsions. Since hyperbaric oxygenation decreased serotonin binding by the microsomal fraction of the cerebral cortex by ca. 47% and MBP increased it by ca. 78%, it appears that a change in the lipid fraction of the embrane is involved in serotonin binding and convulsions. The data indicate that a key mechanism in the toxic consequences of hyperbaric oxygen is an alteration in the membrane lipids due to peroxidation and resultant depression of serotonin binding. The prophylactic use of antioxidants, such as MBP, appears to be a promising approach to prevent brain damage in such situations. Figures 1; references 13: 4 Western, 9 Russian.
[339-12172]

UDC 612.822.3+612.85

AUDITORY EVOKED POTENTIALS IN MAN DURING LATERALIZATION OF A MOVING AUDITORY IMAGE

Moscow ZHURNAL VYSSHEY NERVNOY DEYATEL'NOSTI IMENI I. P. PAVLOVA in Russian Vol 32, No 3, May-Jun 82 (manuscript received 21 Apr 81) pp 472-479

AL'TMAN, Ya. A., BELOV, I. M., VAYTULEVICH, S. F. and MAL'TSEVA, N. V., Laboratory of Auditory Physiology, Institute of Physiology imeni I. P. Pavlov, USSR Academy of Sciences, Leningrad; Special Problems Research Laboratory, First Medical Institute imeni I. P. Pavlov, Leningrad

[Abstract] Electrophysiologic studies were conducted on the auditory evoked potentials (EP) in 17 twenty to forty year old men and women during presentation of a moving auditory stimulus. The results showed that such signals lead to the disappearance of the P_1 component of the EP recorded from the right and left cerebral hemispheres, and result in a reduction of the

latent periods of the N_1 and P_2 components vis-a-vis the latent periods seen during monoaural stimulation or a binaural presentation with an interaural lag time of 900 msecs (which produces complete lateralization of the auditory image). The changes were more pronounced in the right hemisphere, suggesting greater specialization in this sphere for spatial sound evaluation. Figures 3; references 15: 7 Russian, 8 Western.
[331-12172]

UDC 617.51 036.11-085.835.12

HYPERBARIC OXYGENATION IN ACUTE PHASE OF CRANIOCEREBRAL TRAUMA

Moscow ZHURNAL NEVROPATOLOGII I PSIKHIATRII IMENI S. S. KORSAKOVA in Russian Vol 82, No 5, May 82 (manuscript received 1 Jun 81) pp 7-12

ISAKOV, Yu. V., ANAN'YEV, G. V., ROMASENKO, M. V. and AYDE, Kh. B., Departments of Hyperbaric Oxygenation and Emergency Neuro-surgery, Scientific Research Institute of Emergency Medicine imeni N. V. Sklifosovskiy, Moscow

[Abstract] The efficacy of hyperbaric oxygenation (HBO) in the treatment of craniocerebral trauma was tested on 103 patients, with another 103 patient cohort serving as untreated controls. Evaluation of the clinical data and physiologic monitoring showed that HBO, commenced within 1-8 days of trauma (1.6-2 atm for 40-60 min, 6-10 sessions, 1-2 sessions/day), has no significant effect on the rate and degree of regression of neurologic symptomatology in the acute phase. However, HBO was effective in diminishing the incidence of wound infections, meningitis, pneumonia, bedsores, hyperventilation, respiratory arrhythmia, and cardiac hyperdynamia. While decreasing the incidence of mental disorders seen in the acute phase, HBO had no effect on the recovery of speech and motor functions. It appears that, within the limitations listed, HBO has a positive role within the armamentarium of therapeutic measures employed in the acute phase of craniocerebral trauma. References 17: 6 Western, 11 Russian.
[335-12172]

UDC 617.001.17-085.373.6-036.8-092.9

EFFECTIVENESS OF GAMMA-GLOBULIN IN TREATMENT OF EXPERIMENTAL BURNS

Moscow BYULLETEN' EKSPERIMENTAL'NOY BIOLOGII I MEDITSINY in Russian Vol 93, No 6, Jun 82 (manuscript received 10 Dec 81) pp 52-55

MOVSHEV, B. Ye., NEDOSHIVINA, R. V. and KORYAKINA, I. K., Laboratory of Pathologic Physiology, Central Scientific Research Institute of Hematology and Blood Transfusion, Moscow

[Abstract] [Note: Russian text title uses term "alpha-globulin".] Wistar rats were employed in studies on the therapeutic effectiveness of immune rabbit gamma-globulin (induced against burn toxin derived from rat skin)

in the normalization of liver function and the kallikrein-kinin system in rats with experimental burns. The results showed that administration of the immune gamma-globulin (2-3.5 mg/rat 30 min after the trauma) led to full normalization of liver function and prekallikrein levels in 5 days, whereas in untreated animals these parameters remained below normal. Treatment with non-immune rabbit gamma-globulin also resulted in some improvement in the hepatic function and recovery of the prekallikrein concentration, but not to the extent seen with the immune gamma-globulin. These observations point to the usefulness of specific detoxification in the treatment of burns. References 16: 2 Western, 14 Russian.
[359-12172]

UDC 615.814.1.015.4:612.822.3

CHANGES IN CEREBRAL ELECTRICAL ACTIVITY IN ELECTROACUPUNCTURE

Moscow ANESTEZIOLOGIYA I REANIMATOLOGIYA in Russian No 2, Mar-Apr 82 (manuscript received 30 Nov 81) pp 13-15

BELOYARTSEV, F. F., SENINA, R. Ya., TSIBULYAK, V. N. and MIROVICH, I. L., Institute of Biological Physics, USSR Academy of Medical Sciences, Pushchino, All-Union Scientific Center for Surgery, USSR Academy of Medical Sciences, Moscow

[Abstract] An 8-channel "Orion" EEG machine (produced in Hungary) was used in an attempt to overcome the noise difficulties involved in simultaneous electrical stimulation of the brain and recording of the EEG to study changes in cerebral electrical activity during electroacupuncture treatment of 40 patients with neurological disturbances. Electroacupuncture was administered using the H, 14KB, 4G1 and 36E points by passing a pulsed 120 hertz 100 microamp current using an "Elitra-5" machine. A course of treatment consisted of ten 30-minute procedures, with simultaneous recording of the EEG. Delta, theta, alpha and low-beta waves were analyzed for each procedure and for the entire course using the statistical methods of Wilcoxon-Mann-Whitney and Student and correlation analysis. The findings showed: a) that it is possible to make adequate EEG recordings simultaneously with electrical cerebral stimulation; b) that electroacupuncture in the patients observed resulted in EEG changes only when therapeutic effects were positive: increased alpha amplitude was seen at each procedure and throughout the entire course of treatment; c) the correlation between the EEG picture and the effectiveness of therapy makes it possible to predict the effect of the therapy after only a few procedures. Figures 3; references 3: 2 Russian, 1 Western.
[348-9642]

UDC 617.55-089:612.327/.337:615.847

COMPARATIVE STUDY OF THERAPEUTIC EFFECT OF MULTICHANNEL PROGRAMMED ELECTRICAL CYCLES AND SINUSOIDAL-MODULATED, DIADYNAMIC AND GALVANIC CURRENTS

Kiev KLINICHESKAYA KHIRURGIYA in Russian No 2, Feb 82 (manuscript received 2 Dec 81) pp 10-12

SEMENYUTIN, I. P., KUZ'MENKO, A. A., SEMENYUTINA, G. F., ARSHAVA, I. V., PED'KO, N. F., SKAKUN, V. T. and DZHUZHA, A. G., Scientific Research Institute of Clinical and Experimental Surgery, Kiev; Dnepropetrovsk Oblast Therapeutic and Sanatorium Administration; Republic Hospital for World War II Invalids

[Abstract] Studies were conducted on 583 patients with postoperative impairment of the function of bowel evacuation or chronic diseases of the digestive organs to determine the relative therapeutic effectiveness of multichannel programmed electrical cycles and the more traditional physical therapeutic methods employing sinusoidal, diadynamic and galvanic currents. The condition of the patients, aged 15 to 78 and suffering from various diseases from periods of 1 to 26 years, was evaluated before and after treatment on the basis of X-ray, electrogastrograph and duodenal kinesiographic studies and investigation of the duodenal content, the bile, pancreatic secretions and enzyme activity. Electrical treatment was done by passing current through electrodes attached to the patient's body on the anterior abdominal wall and also on the back and lower extremities in order to produce an effect on the nervous system, arterial pressure and venous flow. The findings showed that the method of multichannel programmed electrical cycles is more effective than other methods in resolving postoperative colonic, gastric and duodenal functional abnormalities, and is particularly useful in alleviating dumping syndrome. On the basis of the findings, the method of multichannel programmed electrical cycles is recommended for use in abdominal surgery and gastroenterology, especially for dumping syndrome. References 3 (Russian).
[344-9642]

UDC 615.844.4.015.21:615.212.7].015.4:612.884

CHANGES IN SUMMATION THRESHOLD INDEX IN RATS IN ELECTROACUPUNCTURE AND IN COMBINATION WITH NARCOTIC ANALGESICS IN FREE BEHAVIOR

Moscow ANESTEZIOLOGIYA I REANIMATOLOGIYA in Russian No 3, May-Jun 82 (manuscript received 23 Oct 81) pp 26-27

BARASHKOV, G. N. and STAROVEROV, A. T., Departments of Pathophysiology and Anesthesiology and Resuscitation, Saratov Medical Institute

[Abstract] A study was made of changes in the functional status of the central nervous system in electrical stimulation of acupuncture points, and a comparison was made with the effect produced by narcotic analgesics.

Experiments were conducted on 80 albino rats in which the status of spinal and truncal neural structures was determined from the summation threshold index. For electroacupuncture, square-wave pulses at a frequency of 45 hertz with variable amplitude and a pulse duration of 0.1 milliseconds were passed via a steel electrode implanted at the position of the Cv-3 analog. The analgesics used were morphine (2.5, 5.0 and 10.0 mg/kg) and phentanylum (0.01, 0.02 and 0.04 mg/kg). Initial summation threshold indexes were compared with experimental indexes 15-20 and 25 minutes after electroacupuncture or drug administration. Findings indicated that electroacupuncture has an effect similar to the action of the narcotic analgesics, confirming that acupuncture exerts a morphinic analgesic action, accompanied by typical changes in the functional status of the spinal and truncal neural structures; electroacupuncture potentiated the narcotic analgesics.
Figures 1; references 11: 3 Russian, 8 Western.
[347-9642]

UDC 633.11+633.14]:631.527:632.938.2

TRITICALE AS A POSSIBLE DONOR OF STEM RUST RESISTANCE IN WHEAT

Moscow SEL'SKOKHOZYAYSTVENNAYA BIOLOGIYA in Russian Vol 17, No 3, May-Jun 82 (manuscript received 12 Aug 80) pp 368-370

GOGUN, G. B., North Caucasian Scientific Research Institute of Phytopathology, Krasnodar

[Abstract] Long-term breeding studies were conducted on the use of various triticale strains as genetic donors of stem rust resistance to soft winter wheat varieties (Bezostaya 1, Rannyaya 12, Mironovskaya 808, Mironovskaya yubileynaya, Kishinevskaya 102, etc.). The results showed that F_2 hybrids could be selected which served as progenitors of lines showing all the typical characteristics of wheat yet possessing triticale-determined, stem rust resistance; certain of the useful F_2 hybrids were derived from F_1 hybrids that were highly susceptible to the stem rust agent. Triticale varieties which were demonstrated to be superior donors were Rosner (Canada), AD 71-196 (Ukraine), and AD B-35 (Hungary). References 8: 7 Russian, 1 Western.
[350-12172]

UDC 616.0172+615.849/23.03

EFFECTS OF HIGH ALTITUDE AND IONIZING RADIATION ON CERTAIN FACTORS OF HUMORAL, NONSPECIFIC IMMUNITY

Frunze ZDRAVOOKHRANENIYE KIRGIZII in Russian No 2, Mar-Apr 82 pp 12-15

MOLDOTASHEV, B., DANIYAROV, S. B. and MUSTAFINA, F. S., Kirghiz State Medical Institute

[Abstract] An investigation was conducted on the effects of high altitude hypoxia (3200 m) and ionizing radiation (^{137}Cs source, 9.0 grays total dose) on serum levels of complement and beta-lysine and lysozyme activities as representative factors of nonspecific immunity in outbred albino rats. Evaluation of the different parameters showed that high altitude hypoxia activated nonspecific immunity and attenuated the inhibitory effects of ionizing radiation, leading to more rapid post-irradiation recovery. Of the three factors under investigation, complement was least affected by changes in altitude.
[352-12172]

UDC 614.898+614.7]:061.3(47+57)"1981"

FIRST ALL-UNION CONFERENCE ON 'RADIATION SAFETY OF THE POPULATION AND ENVIRONMENTAL PROTECTION IN RELATION TO OPERATION OF NUCLEAR POWER PLANTS'

Moscow GIGIYENA I SANITARIYA in Russian No 3, Mar 82 pp 92-93

DOSHUTIN, K. K., Moscow

[Abstract] The First All-Union Conference on the title subject was held on May 26-28, 1981 in Dimitrovgrad. The conference was organized by the USSR Ministry of Health and Institute of Biophysics of that Ministry, and was attended by 170 representatives of 80 organizations. The 30 plenary reports and 62 exhibits covered and evaluated the various aspects of radiation safety problems connected with nuclear power plants, and delineated projects to be undertaken along these lines during the 11th Five-Year Plan. The decision was also reached to hold the Second All-Union Conference in 1986.
[321-12172]

UDC 616.419-001.29-092.9-07:616.419-003.971-092:616.155.32-008.1

INVOLVEMENT OF LYMPHOCYTES IN RECOVERY OF HEMOPOIESIS FOLLOWING LOCAL IRRADIATION

Moscow BYULLETEN' EKSPERIMENTAL'NOY BIOLOGII I MEDITSINY in Russian Vol 93, No 3, Mar 82 (manuscript received 4 Sep 81) pp 97-99

GOL'DBERG, Ye. D. and DYGAY, A. M., Chair of Pathophysiology and the Central Scientific Research Laboratory, Tomsk Medical Institute

[Abstract] Histologic studies were conducted on the involvement of lymphocytes in the regulation of hemopoietic stem cells, employing intact and thymectomized BALB/c mice with an irradiated extremity (7.0 Gy dose), and thymocyte injections. Comparison of the findings for the various groups of animals demonstrated the accumulation of lymphocytes in the bone marrow prior to the recovery of active hemopoiesis. The lymphocytes were largely T cells that migrated in from the thymus and other lymphoid organs and appeared to accelerate colony-forming activity of the bone marrow with subsequent recovery of hemopoietic activity. Figures 2; references 12: 5 Western, 7 Russian.
[324-12172]

UDC 615.849.114.015.3.015.4:616.155.34

DOSE EVALUATION AND PROGNOSIS OF NEUTROPHIL COUNTS FROM HEMATOLOGIC INDICATORS IN GAMMA-IRRADIATED MAN

Moscow MEDITSINSKAYA RADIOLOGIYA in Russian Vol 26, No 8, Aug 81 (manuscript received 28 Dec 80) pp 11-16

BARANOV, A. Ye.

[Abstract] A retrospective dose-effects study was conducted on a 32-year-old male accidentally exposed to ^{60}Co. Calculation of the actual whole-body exposure dose from geometric consideration and known activity of the radioactive source yielded a value of 2.1 Gy; the dose calculated from chromosomal aberrations in the patient's lymphocytes yielded a value of 2.25 Gy, as did calculations based on peripheral blood lymphocyte counts on the 4-7th day after irradiation. Lymphocyte counts obtained on the 1st, 2nd, and 3rd day yielded erratic values for total body exposure (0.45, 6.6, and 3.35 Gy, respectively). These findings indicate that excellent estimates of whole-body exposure to gamma radiation can be obtained from standard curves for lymphocyte counts on the 4th to 7th day after irradiation. Figures 2; references 6: 3 Russian, 3 Western.
[327-12172]

UDC 616-006.364.04-092.9-085.849.1.015.2:615.832.1]-091

EFFECTS OF SEPARATE AND COMBINED IONIZING RADIATION AND HYPERTHERMIA ON MORPHOLOGY OF RHABDOMYOSARCOMA IN RATS

Moscow MEDITSINSKYA RADIOLOGIYA in Russian Vol 26, No 8, Aug 81
(manuscript received 1 Jan 80) pp 53-60

LUSHNIKOV, Ye. F., SVINOGEYEVA, T. P., SHTEYN, L. V. and KONOPLYANNIKOV, A.G., Scientific Research Institute of Medical Radiology, USSR Academy of Medical Sciences, Obninsk

[Abstract] Studies were conducted on Wistar rats with subcutaneous implants of radio- and thermoresistant rhabdomyosarcoma R-1 to test the efficacy of separate and combined treatment with gamma irradiation (20 Gy) and hyperthermia (42°C for 1 h). The results showed either modality alone had little effect on tumor growth; however, combined therapy (one or two 20 Gy doses followed by hyperthermia) resulted in a "cure" of 30% of the animals. Hyperthermia induced necrotic changes in the tumor within a day with interphase cell death, distinct demarcation between affected and unaffected parts of the tumor, and the formation of a small number of giant cells, in a week. Gamma irradiation induced poorly demarcated lesions that became apparent within a week, and significant number of giant cells within three days. Combined therapy induced mixed morphologic features, with the effects of hyperthermia preceding those of gamma irradiation. Figures 5; references 14: 4 Russian, 10 Western.
[327-12172]

UDC 616.5-001.29-02:615.849.1.-015.3

SKIN REACTION OF LOCALLY IRRADIATED ANIMALS AS A FUNCTION OF DOSE AND OF THE CHARACTER OF ITS FRACTIONATION

Moscow MEDITSINSKAYA RADIOLOGIYA in Russian Vol 26, No 8, Aug 81
(manuscript received 4 Dec 80) pp 61-65

IZOTOV, B. M., Leningrad Institute for the Advanced Training of Physicians imeni S. M. Kirov

[Abstract] A review is provided of the literature dealing with radiation dose fractionation to attain maximum therapeutic effectiveness in tumor therapy with minimum damage to healthy tissue. Particular attention is devoted to the various changes in the skin and the calculation of slopes for isoeffective lines of dose-time plots. Nevertheless, lack of agreement in the literature as to standard conditions for the evaluation of optimum fractionation points to the need for further intensive research. References 32: 4 Russian, 28 Western.
[327-12172]

UDC 582.232:577.391

POST-IRRADIATION STIMULATION OF LIPID SYNTHESIS IN ANACYSTIS NIDULANS CELLS

Moscow BIOLOGICHESKIYE NAUKI in Russian No 5, May 82 (manuscript received 21 Jul 81) pp 85-89

GROSHEV, V. V. and TIFLOVA, O. A., Chair of Genetics and Breeding, Moscow State University imeni M. V. Lomonosov

[Abstract] Biochemical studies of the four major lipid fractions (sulfoquinovisyldiglyceride, phosphatidylglyceride, digalactosyldiglyceride, monogalactosyldiglyceride) of the cyanobacterium Anacystis nidulans showed that their rate of synthesis following X-ray or UV irradiation was directly proportional to the dose. Synthesis of these lipids represented a compensatory process for repair of membrane damage and restoration of structural patency of the microorganism, and represented a convenient model for studying the correlation between radioresistance and biochemical repair processes. Figures 1; references 21: 10 Russian, 11 Western.
[339-12172]

UDC 612.821.6

DYNAMICS OF AN ESTABLISHED MOTOR-AVOIDANCE CONDITIONED REFLEX IN RELATION TO LEVEL OF MOTIVATION IN IRRADIATED RATS

Moscow ZHURNAL CYSSHEY NERVNOY DEYATEL'NOSTI IMENI I. P. PAVLOVA in Russian Vol 32, No 3, May-Jun 82 (manuscript received 2 Jun 81) pp 463-471

SHTEMBERG, A. S., Moscow

[Abstract] Studies were conducted on the retention of established conditioned motor-avoidance (40, 50 or 60 V shocks) in Wistar rats exposed to supralethal levels of gamma irradiation (94, 111, or 137 Gy). The findings showed that irradiation introduced phasic changes in conditioned behavior as the radiation sickness progressed. Following an initial short-term deterioration in the avoidance reaction full recovery was seen, which was particularly noticeable with the higher shock voltage (60 V). The data were interpreted to indicate that in supralethally irradiated rats the temporal connections formed in the CNS remain functional until demise of the animals. Figures 2; references 18: 5 Western, 13 Russian.
[331-12172]

UDC 612.015.1

EFFECTS OF IRRADIATION AND SEROTONIN ON ERYTHROCYTE MEMBRANE ATP-ASE ACTIVITY AND K+ PERMEABILITY

Leningrad VESTNIK LENINGRADSKOGO UNIVERSITETA: BIOLOGIYA in Russian No 9, Issue 2, May 82 (manuscript received 19 Mar 81) pp 67-72

ZHEGNEVSKAYA, V. V., VINOGRADOVA, M. F. and POLEVOY, V. V.

[Abstract] Studies on the relationship between erythrocyte irradiation and changes in K+ permeability and serotonin involvement in membrane patency showed that one hour after X-irradiation (25.8 Kl/kg) of citrated rat blood the Na,K-ATPase activity of the erythrocyte membrane increased by 41%. The enzyme activity was unaffected by irradiation of the red cells in isotonic NaCl. However, under both conditions K+ efflux from the erythrocytes increased 2.9-fold; addition of serotonin (2×10^{-4} M) to the blood sample prior to irradiation diminished K+ loss without affecting the Na,K-ATPase activity. These findings were interpreted to indicate that the early post-radiation effects involved changes in the erythrocyte membrane structure without affecting active transport, and that the radioprotective effects of serotonin with respect to K+ permeability were due to its effect on the passive permeability of the membrane. References 22: 8 Western, 14 Russian. [337-12172]

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EFFECTS OF HEPARIN ON POST-IRRADIATION THYMIC RECOVERY IN MICE DIFFERING IN RADIOSUSCEPTIBILITY

Moscow BYULLETIN' EKSPERIMENTAL'NOY BIOLOGII I MEDITSINY in Russian Vol 93, No 6, Jun 82 (manuscript received 10 Dec 81) pp 112-115

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[Abstract] Studies on the effects of heparin (250 U/kg from the 5th to the 9th post-irradiation day) on thymic recovery in radiosusceptible (BALB/c and outbred white mice) and radioresistant (CBA x C57BL)F_1 hybrids) mice exposed to Co^{60} gamma irradiation (4-6 Gy) showed that heparin was effective in minimizing the secondary (20th day) loss in thymic weight in the radiosusceptible mice, but did not affect the weight in the radio-resistant hybrids. Post-irradiation loss in thymic weight on the 5th day was essentially identical in both groups (24.3 to 31.4% of normal weight), while the corresponding values on the 20th day for BALB/c, outbred, and hybrid mice were, respectively, 32.0% untreated and 49.2% treated, 42.5% and 60.0%, and 62.8% and 62.8%. Furthermore, heparin was observed to retard the emigration of cells from the thymus of the radiosusceptible mice, and to promote an increase in the thymic myelokaryocyte counts in the radioresistant hybrids. Figures 1; references 15: 4 Western, 11 Russian. [359-12172]

PSYCHOTHERAPY FOR SOMATIC DISEASES

Ashkhabad TURKMENSKAYA ISKRA in Russian 30 Jun 82 p 2

[Article by A. Omarov in the column "For the Soviet Man": "In the Service of Health"]

[Excerpt] The first psychotherapy office in the republic for people suffering from somatic diseases has opened at the Republic Clinical Hospital imeni Pirogov. Dr A. Khusnutdinov is the director. TURKMENSKAYA ISKRA correspondent V. Zarembo asked him to describe his work and the purpose of the new office.

"In recent years the pace of life has increased, and nervous and emotional strain on people has intensified. The operating speed of machinery, factory equipment, and production lines has risen sharply. The burden on the human nervous system has grown. The flow of information has become immense as well. These factors often create stressful conditions, psychological fatigue, and sometimes even neuroses. Psychotherapy can provide some real help in these situations.

"The office has just been established and so we still have some problems. We are unable to admit all the people who want treatment. We hope in the future, however, to expand the circle of visitors.

"One of the effective methods of treating somatic diseases can be therapeutic physical exercise. In September we are planning to institute sessions of psychotherapy augmented by a physical fitness program. For many regular patients of polyclinics and hospitals, this will be a reliable method of release from their sickness."

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PROGRESSION OF SIMPLE PSYCHOPATH-LIKE SCHIZOPHRENIA: DIAGNOSIS AND SIGNIFICANCE IN FORENSIC PSYCHIATRY

Moscow ZHURNAL NEVROPATOLOGII I PSIKHIATRII IMENI S. S. KORSAKOVA in Russian Vol 82, No 5, May 82 (manuscript received 30 Jul 81) pp 113-119

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[Abstract] Clinical examinations were conducted on four groups of patients with simple schizophrenia; the male and female cohort exhibiting psychopathic tendencies ranged in age from 16 to 59 years. Evaluation of the subjects with the explosive and thymopathic variants of the disease showed that the intellectual processes were particularly influenced by emotional factors, while the patients with hysterical tendencies presented with emotional pretensions and overemphasis on insignificant concepts and objects. The psychoasthenic patients showed difficulty in identifying major objectives, tended to formulate pseudoabstract constructions and actualize insignificant details and experiences. Generally, initial stages of the disease began with some form of emotional stress and poorly-defined apprehension. Such patients were known for emotional lability and frequently inappropriate reactions to various stimuli. There were no telling differences in the antisocial actions of the subjects which resulted in their being brought to the attention of forensic psychiatrists, except that such events coincided with the height of their paranoia, emotional depression, and social deadaptation. References 9 (Russian).
[335-12172]

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